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THE PROBLEM OF PARTIAL PROSTHESIS

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FOR the first time in the history of the dental profession, a group of men have been brought together in an organization of national scope for the exclusive consideration of the problems involved in restoration of a part of the natural denture, and in an organization which bids fair to have a continuing and representative existence. This is significant, and the fact carries the promise of accomplishing in this field results as gratifying as have followed the establishment of similar groups in the specialties of orthodontia, periodontia and full denture prosthesis. The establishment of a section of the American Dental Association in which this branch of dentistry may be discussed is not of itself important since similar sections in other fields of dental practice have been looked upon simply as a rostrum from which each worker has presented his individual views. Were this to be the case in this section, I would not feel justified in presenting this paper; but with the thought that we are all earnestly seeking the benefits of co-operative effort which such an organization makes possible, has this paper been prepared. It is reasonable for us to hope that we may here lay down principles which shall lead to the development of fundamentals upon which shall be based a scientific system for partial restoration.

The history of this branch of dentistry reveals, as in all other branches, the efforts of earnest and able individuals to solve its problems. To each of these has been revealed a part of the truth, and upon that each one has builded success-

fully. But when such ideas have been imparted to others, the application of these ideas has been attended with varying success. Moreover, up to the present time, there has been no individual nor agency through which ideas presented by so many investigators might be analyzed, their good points retained and their weak points eliminated. It is only by such a process carried on by broadminded and farseeing men that a system may be developed through which all the varying requirements of partial prosthesis may be met.

We must approach this subject with a full realization that such a process of evolution can only be successfully worked out through the willingness of each man to surrender principles which he has previously held, when he is shown that other principles are superior. Development must proceed as in our form of government, wherein the unlying principle is that the judgment of the majority is the correct one. Care must be taken, however, that any principle which is advanced shall be judged purely on the correctness of the result, and that it shall not be discarded because of difficulties of technic. One thought more: if this section is to live up to its possibilities, each man in it must be honest and fair with himself and with his colleagues. Our whole idea must be a pride in this organization, and a unity of purpose and thought in the development of the science of this branch of dentistry.

The first question to be considered is the object which lies back of the restoration of one or more teeth in a mouth in which some of the natural teeth remain. Beginning with the loss of one tooth, we find every variation in the number of teeth to be restored, up to the point where a full restoration is required. We may take it for granted that the first object of a partial denture is the restoration of a normal masticating apparatus. Other objects are the retention of the normal position of the remaining natural teeth; retaining the natural teeth in the mouth in a state of health; maintaining the health of all the tissues involved in the functioning of the restoration; meeting the esthetic requirements; durability of the supplied teeth, of the attachments and of the abutment anchorages; correct technical procedures. Each one of these points must be adequately met by any partial restoration which is to be considered successful.

The first step in partial restoration, as in all dental treatment, is the making of a complete diagnosis. This should cover the study of the health of the remaining teeth and their supporting structures, and also the condition of the other tissues of the mouth. This must include a complete radiographic survey of the mouth, including edentulous areas, as well as the areas surrounding the remaining teeth. Teeth exhibiting evidence of periapical or parietal disease which seem unlikely to be improved by treatment, must be recommended for extraction. Treatment for such diseased conditions, as may appear to be amenable to treatment, should receive the proper care. This may mean the inclusion of the placing of inlays for the restoration of approximal contact points, as a prerequisite to the successful treatment of disease in the inter-dental spaces.

Having placed the mouth as nearly as may be, in a state of health, the next step in diagnosis is the decision as to the type of restoration best suited to the case. This will determine the teeth which are to be used as abutments. In considering this point, both physical and radiographic examination must be employed, since only in this way is it possible to determine the character of the alevolar support. Study models are required for the determination as to which teeth are to be used for abutments. These are a necessity in the planning of the case, as well as being a help to the periodontist in the remodeling of occlusal surfaces.

Stated in brief, the procedure for the average case should be as follows:

1. Physical examination of the mouth and teeth.
2. Complete radiographic survey.
3. Notation of the general physical condition of the patient, including both oral and general history.
4. Determination of "hopeless" teeth which must be extracted, and study of doubtful teeth which *may* require extraction. This study may require the determination of the accessibility of root-canals and the prognosis of periodontic and orthodontic treatment.
5. Extraction of condemned teeth.
6. Institution of periodontic, root-canal and orthodontic treatment, and restoration of contacts where needed. The order in which these procedures are taken up depends upon the necessities of the individual case.
7. Impressions and bite for study models.
8. Planning the type of restoration and selection of teeth to be used as abutments. The type of case will frequently depend on the character and positions of the teeth which it may be desired to use as abutments. It may frequently happen that a tooth whose position renders it desirable as an abutment, will prove unsuitable because of insufficient alveolar support.
9. Consultation with the patient as to his ability to afford the type of restoration which seems best suited to the case.
10. Selection of the type or types of attachments.
11. Preparation of the abutment teeth is begun following the completion of such root-canal, periodontic and orthodontic treatment as may be necessary.
12. Construction of restoration.
13. Insertion of restoration and final adjustment of occlusion.

The first point to be taken up under the heading of "restoration of the masticating apparatus" is concerned with its continuing efficiency. It may be taken for granted that no restoration of a lost tooth will, for an indefinite period of time, have the same masticating efficiency as the healthy and normal tooth which it replaces. In other words, it may be possible to exactly restore masticating efficiency, but if it is so restored, it will necessarily be at the expense of an unnatural and therefore excessive stress upon the structures which support the substitute. We are at once forced into a compromise in order to preserve the health of these supporting structures, our effort being to approach normal masticating efficiency as nearly as is consistent with these considerations. Naturally, the percentage of approach to the normal efficiency will depend upon the number of teeth to be supplied and the number, arrangement and alveolar support of the abutment teeth. The question of continued alveolar support of the abutments is contingent upon the physiological and mechanical resistance of the individual, and also upon any disintegration of alveolar bone which may have taken place prior to the introduction of the appliance.

In the effort, as nearly as possible to restore masticating efficiency, it is generally conceded that we may achieve the best results when the occlusal surfaces of the restoration copy most nearly the diameters and contours of the original teeth. The next point is the support of the restoration, which should be of such a nature as to withstand occlusal stress to the degree considered safe, as regards the remaining teeth and other oral tissues. It will be understood that under occlusal stress we include both vertical and lateral stress, together with the bearing which each may have upon the health of the abutment teeth. This problem is dependent upon the relation of the supplied teeth and of the saddles, if any, to the abutment teeth and to the supporting mucosa. Analysis of the various types of restorations makes it probable that the most injurious effect to the abutment teeth is produced by lateral stress, rather than by vertical stress, although the possible injury from undue vertical stress must be given careful consideration. This problem is dependent upon the proportion of the number and position of the supplied teeth to the number and position of abutment teeth, as-

suming the occlusion to be otherwise correct. On the other hand, saddles which are not given suitable support by abutment teeth will inevitably cause resorption, if not actual injury of the alveolar mucosa. Undue lateral stress upon abutment teeth will invariably be produced if the relations of the inclined planes of the supplied teeth to their antagonists are inharmonious. The most common cause of this inharmony is undue length of cusps, as well as improper buccolingual relation.

The study of inharmonious vertical and lateral relationships must naturally include the preparation of the occlusal surfaces of all the remaining teeth, since inharmony of the natural teeth will be quite as injurious as that of the supplied teeth, and will thereby prejudice the success of the restoration. Such remodeling may best be performed by the trained periodontist whose study of occlusal trauma particularly fits him for this operation. The services of the periodontist also are very frequently required for the treatment of incipient or advanced periodontoclasia. Such treatment, if needed, should usually precede the impressions and bite for the construction of the restoration. In such cases as may exhibit the probability of a change in the surface contours of soft tissues, periodontic treatment should invariably be given first.

Teeth which have drifted or have erupted into such a position as to render conditions unfavorable for restorations, should, if possible, be brought into proper relations by orthodontic treatment.

The retention of the remaining natural teeth in their normal positions depends upon several factors: Most important is the occlusal relation of all the teeth, both natural and supplied. Next comes normal approximal contacts which are requisite for the prevention of mesio or distal migration. Following these, we must consider the correct distribution of stress to the abutments, and correct relation between the stress on the abutments and on the alveolar mucosa.

The preservation of the health of the remaining natural teeth with special reference to the health of the abutment teeth, depends upon the foregoing considerations, and in addition, upon the proximity of the saddles to the abutment teeth. Frequent periodic prophylactic treatment is a requisite for the continued health of all the oral tissues. At the time of each prophylactic treatment, careful inspection of the restoration and of the entire denture is made to detect any possible derangement of the occlusal relation.

Every restoration is a mechanical device and is subject to wear and tear. It therefore needs from time to time, not only repair, but adjustment, as does every mechanism. The proportionate wear upon the occlusal surfaces of the natural and supplied teeth, will vary with the materials used in the construction. Practically all materials used in restorations offer greater resistance to abrasion than does the enamel. Occlusal relationships then, are frequently changing, and the ultimate success of the restoration depends in a large degree upon the maintenance of the normal occlusal relations. Derangement of this relation will not only prejudice the success of the restoration, but may lead to disease of the abutments and other natural teeth.

The esthetic requirements of a case frequently demand the carving, remodeling and staining of porcelain teeth. This enables the operator to provide substitutes whose surface contours and coloration will harmonize with the remaining natural teeth, and with the facial type of the patient. It is a matter for congratulation that the art of ceramics is being recognized as an essential part in the production of acceptable prosthetic restorations. It is to be desired wherever possible that no evidence of artificiality shall be presented to those with whom the patient comes in contact.

Durability of the supplied teeth im-

plies not only the use of a suitably resistant material for the teeth themselves, but a supporting saddle which shall be sufficiently rigid to properly accept mechanical stress. The attachments must be so constructed as to give the requisite support with a minimum of wear, and without physically endangering the teeth in or on which they are placed. Reference should also be made to the necessity for strength at the soldered joint where the attachment is united to the saddle.

Correct technical procedures imply such preparation of abutments and such construction of abutment anchorages as will present normal contours and smooth margins at all points. The technic of construction of the restoration must be so precise that the finished piece will go to place without the necessity of drawing or pushing abutment teeth out of their position. This necessitates the standardization of casting and soldering technic so that each piece may be carried to completion with confidence in the accuracy of the final result.

The practice of placing a bridge in the mouth for several days without cementing to place, implies a distortion during construction which should not obtain, and which may result in the untimely loss of the restoration through disintegration of the tissues supporting its abutments.

In conclusion, let me say that foremost among the ideals for which we should honestly strive in this field, is the development of a type or types of restoration which will do away with the necessity for devitalizing teeth which are to be used as abutments. If the establishment of this section can bring about this one thing alone, it will have been an achievement which will redound to the credit of our profession as long as restorations must be made. It will be many a day before the advancement of oral prophylaxis may eliminate the loss of natural teeth, and up to that time shall we be more and more called upon to make restorations for the loss of a part of the dental mechanism. Let it no longer be said that a partial restoration is the first step on the road to a full denture.

There are a number of other problems which lie before us, although some may consider certain of these already settled. However, I wish to catalog them in brief, as a suggestion for the work of investigation which the section may profitably undertake.

There is much contention regarding fixed bridge-work. It is argued that the limitation of independent movements of abutments necessarily induces pathological change in the tissues supporting these abutments. The defenders of the fixed bridge argue that these changes are due to traumatic occlusion, and not to fixation. It is unfortunate that so many factors may enter into even this one question. For on the one hand we find many variations in the position of these bridges in the mouth,—the number of supplied teeth in relation to the number of abutments; the number of bridge teeth as related to the number of remaining natural teeth; the length of root, the inclination of root, and previous condition of alveolar bone supporting the abutment teeth, and also the foregoing considerations as related to the same items concerning the remaining natural teeth. On the other hand, a *real* understanding of traumatic occlusion has been of so recent a development among periodontists, that we may safely assume that comparatively few bridges either fixed or removable, have been blessed with an entirely harmonious, and therefore innocuous occlusal relation. If this is true, can we make positive assertions regarding the effects of fixation of abutments, until extended observation has been made of a large number of fixed bridges correctly constructed and with occlusal relations which have been passed on by *competent* periodontists? On the other hand, if fixed bridges may do all that has been charged against them, why give them any further consideration in

view of the advocated advantages of the removable bridge? Because there is one fact which is not to be denied: viz, that the fixed bridge, supported entirely by abutment teeth, comes nearer to restoring masticating efficiency than does the removable bridge, unless it too receives its entire or at least its major support from its abutment teeth. Whether the entire restoration of masticating efficiency is compatible with the continued health of the abutment teeth, is a question. And I believe the only solution of this problem, too, lies in the construction of short fixed bridges in selected cases, the occlusal relation to be verified by a competent periodontist.

One problem to which I have already referred, and which has received little or no serious attention, concerns the relation of the degree of inclination of the inclined planes to the number of supplied teeth, and to the alveolar support of the natural teeth. To elucidate,—periodontists recognize the fact that the gradual wearing down and flattening of cusps which takes place in the course of years in the normally functioning natural denture, produces a gradual dissipation of the buccolingual stress of cusp against cusp, whereby the strains upon the supporting tissues are lessened. They also recognize the fact that the failure to accomplish this alteration of the angle of inclination of these cusps, will, in many cases, produce a traumatic occlusion due to the lessened mobility of the teeth through the thinning of the pericementum which occurs with advancing years. In other words, the greater the stress, especially the buccolingual stress, the less must be the slope of the inclined planes, in order that the leverage of the cusps against their antagonists shall be brought within the limit of safety for the supporting structures. If this is true in the natural denture, how much more is it true when a tooth, in addition to supporting a stress which nature intended it to bear, is called upon to support stress imposed upon it by cusps supplied on a structure of which it is an abutment. It matters not whether the restoration be fixed, removable, or movable removable, there is a lateral stress of some degree transmitted to the abutment tooth. And this stress is directly related to the inclination of the various inclined planes. In this connection, it may be well to call attention to the necessity of having the corresponding inclined planes on the opposite sides of the mouth harmonize as to their angle of inclination. How often do we see a long lingual cusp on an upper molar, for instance, by reason of its sharper inclination, lift away the buccal cusps on the opposite side of the mouth when the patient would bring them into use in the oscillating movements of the mandible? We like to say that we must have a good occlusion if our work is to be successful. But I wonder how many of us really know what a good occlusion is, or how to remedy a poor occlusion? It is this question which prompts me to suggest the co-operation of the trained periodontist.

Consideration of the problem of buccolingual stress brings to the fore the question as to the possible harm produced by the construction of unilateral bridges to supply posterior teeth. It is a fact readily demonstrable that an attachment on the opposite side of the mouth connecting by some form of bar with the bridge proper, breaks much of the buccolingual stress which must otherwise fall chiefly on the primary abutments, i.e., those at either end of the space to be filled. No unilateral removable bridge, whether movable or of the rigid attachment type, will in all cases provide sufficiently for the relief of buccolingual stress. And the fixed bridge, unless it has three or more abutments not in a straight line, will inevitably bring a considerable, if not an injurious, buccolingual stress on its abutments.

In the consideration of saddles, the cast and swaged saddle, each have their advocates. And the swaged saddle is by some provided with a slight ridge around

its circumference to improve its adaptation to the mucosa at this point. Whether this ridge may interfere with the circulation in the mucosa, particularly near abutment teeth, is a question which should receive careful consideration, since this method of producing a saddle has some definite advantages. Impressions for assembling saddle dentures are taken by some with the saddle under pressure, by others without pressure, and by others after constringing the mucosa by the application of adrenalin. By just how much the abutment teeth are relieved of vertical stress in function, when the assembling impression is taken with the saddle under pressure, is a question. How the degree of pressure which may best suit the individual case is to be regulated is a point which is difficult to settle. It is safe to say, however, that it is not possible to apply to a saddle during impression taking, the amount of pressure which it will afterward receive in use, unless the opposing jaw is used to produce that pressure. And if it were possible, it is a question as to whether that amount of pressure would be desirable.

The advantage or disadvantages of fixation of abutments in removable bridges while the denture is in place require more careful adjudication. The advocates of attachments which make no provision for individual movement of abutments while the bridge is in the mouth, can point to clinical results which command attention.

I will not burden you by enumerating further the problems which confront us. Nor do I present a brief urging my individual beliefs in regard to the points I have raised. My studies have shown me that these problems are inherent to the science of partial restorations, and I trust and believe that the members of the section on orthodontia, periodontia and full denture prosthesis will set about the solution of these and other problems in the impartial manner in which I have endeavored to present them.

We are all endeavoring to co-operate in the development of a system of partial prosthesis which shall be more perfect than any which the individual members of this section have evolved. As has been stated, this much-to-be-desired result can only be obtained by every one of us giving freely of his best and also by a willingness on the part of every one to lay upon the altar of progress those ideas which may be dear to him, but which may prove to have shortcomings. In this process of self-sacrifice, there must be no resentment, if the idea which is to be accepted may be one with which we have heretofore disagreed. No thought of a personal nature must interfere with this process of evolution. Therefore, I wish to make public avowal of my entire willingness to present freely my beliefs and the principles which I have followed in this field. I will gladly sacrifice any principle which the unbiased judgment of my colleagues declares to be unsound and will be proud, indeed, if any contribution of mine may be adjudged of permanent value in this work.

THE APPLICATION OF A STANDARD OF PERFECTION TO ORAL RESTORATION.—BRIDGE-WORK

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THE need has long been felt of some form and degree of standardization in the work of partial oral restoration and the subject has frequently been mentioned in convention hall and journal but no definite or worth-while result has come out of such perfunctory discussions as have been brought forward periodically and spasmodically nor indeed does any serious effort seem to have been made to that end. This seems to be due to two primary causes. First, while such need has been felt by those restless and resistless few who are never satisfied with present achievements—with the level upon which they find themselves and their profession, but who are seeking always the openings, rugged and unexplored through which they may climb to greater heights and attainments—it has not been able to force itself upon the consciousness of the great mass of the profession who, to change the figure, have been content merely to float with the tide or to gather in little eddies about this or that man with his system or method or hobby or fetish, as driftwood gathers about a common center and floats and swirls in the more secluded and quiet edges of the stream, until the storms of criticism drive them upon the shore to bleach in the wind and sun of scientific investigation and progress. The second cause is that no Moses has arisen to lead us, weary wanderers that we are, out of the wilderness. Those who have essayed the task of leadership have fashioned golden calves for our worship or erected for us alters to the unknown gods. But no man has come forward to lead us along the straight and narrow way to the promised land of scientific achievement. Some have made suggestions but have seemed to lack definite convictions or the courage that acts as a driving force behind such convictions as they have had. And so it comes to pass that many decades after the introduction of bridge-work as a means of replacing lost parts of the human denture we find the whole subject in an uncongealed state—a church with no creed; a business with no governing principles; an organization with some by-laws but no constitution; a game with no rules for its playing! We are in the anomalous position of trying to produce something with no standardized ideals as a basis of our efforts, or ideas of what it is we are trying to achieve, or the whys and wherefores of our procedures; and consequently with no standard by which to estimate and compare the values of our own production or those of our confreres. Thus there have grown up several schools, numerous divisions and sub-divisions and many fads and "isms" pertaining to oral restoration, and one man or school with a penchant for one phase of endeavor and one for another, with the result that most of our productions are one-sided—excellent no doubt in respect to the particular feature most attractive to the producer but deficient in others

that are of equal and in many cases of greater importance. Such a state of affairs is distressingly unworthy of so vital and wonderful a part of the human organism as its dental apparatus with the dramatic possibilities of its mechanical perfection and performance and the poetic beauty of its esthetic and cosmetic excellence. I have found my own release from this intolerable state through what I have chosen to call a standard of perfection. The idea, frankly, is drawn from the producers of fine stock whose specimens as observed in the show rooms are bred both for practical and esthetic purposes. These producers know what the practical purposes are and have a keen sense of esthetic values and they know how to breed for form, size, color, etc., in the various parts as well as of the specimen as a whole in order to serve these purposes, practical and esthetic. Pooling ideas as to details and taking the best of each, they arrive at conclusions pertaining to each individual part and the relations of part to part and of each to the whole which, being reproduced, would constitute the ideal or perfect specimen. Thus every detail is standardized and recorded for the guidance of all and this record or guide is called the standard of perfection. By its terms and specifications are valued and compared all the specimens of a given class and their relative values estimated that every producer may know the standards to the minutest detail to which he must breed if he would produce these values and enter into competition.

Is there any reason why we should be less astute than these men who engage in a calling confessedly upon a more material level? I am persuaded that if the dentist is to be as successful in achieving the ends of his calling as is the practical man of affairs he must use the same wisdom and judgment and discretion. We must have our own standard of perfection—such a standardization and codification of ideals, fundamental principles, and ideas through which to give them expression as will serve as a guide to the production of the greatest possible service in its most comprehensive meaning and comprising every element that enters into it. On what shall we base such a standard? On a knowledge obviously of what constitutes service, the elements that enter into it and the operation of those forces and factors through which it is produced. Service, as it pertains to our efforts, means the re-establishment in the highest possible degree of physical integrity and function and the provision for their perpetuation; and in order that we may understand what re-establishment means we must first know physical integrity and function in the normal that when deviation and deterioration occur we may have a definite goal toward which to work in our efforts at rehabilitation.

Let us make a brief survey then of these matters. The first thing we discover is that the dental apparatus is a part of the human body; composed of the same materials that enter into the construction of other parts of the body; amenable to the same laws of growth and development; connected with and nourished by the same circulatory system, playing its individual part in the maintainance of the organism, subject to the same reactions from processes going on in the organism and to the same degenerative influences. Since it is only after accident or deterioration that we are called into service, our restorative efforts are always in connection with pathological conditions or relations or both. All such remedial efforts—efforts directed toward the correction of defects and deficiencies and derangements in the living organism—partake of the nature of surgery. It is true that these corrections are brought about more or less by mechanical means; but so are all surgical operations—the laparotomy, the amputation, the tonsillotomy, etc.,—mechanical procedures. Since we are dealing with the living organism then, and directing our efforts to the rehabilitation

of its integrity and function, and since this is a surgical procedure, it is clear that surgery must be accounted one of the foundation principles on which we must base our efforts at oral restoration.

Coming to the consideration of the practical relation of the dental apparatus to the human organism, we find it located at the beginning of the alimentary tract. It is into this passage way that the nutriment for the sustenance of the body is introduced and where those physical and chemical changes take place in these nutrient materials that fit them for assimilation by the body. In contemplating these processes it is readily understood that the rapidity and certainty with which the necessary chemical changes take place depend in large measure upon the proper comminution or physical preparation of the food material for chemical attack by the digestive secretions—the more complete the grinding and pulpifying process, the greater the amount of food surface exposed to chemical attack, and the more complete the digestive process in the time nature allots to it; and with the less strain on the digestive apparatus. Further consideration reveals that the oral cavity—the very beginning of the alimentary tract—is the place where this grinding and pulpifying process takes place; that the dental equipment is the apparatus by means of which it is accomplished; and that nature has formed, arranged and related the parts of this apparatus for that definite and particular service to the organism. This part of the digestive process, then, is purely mechanical, performed by a mechanical apparatus constructed by nature for the specific purpose, on the highest engineering principles as to materials, conformations, arrangements and relations of its parts. This, taken in connection with its controlling mechanism and its active operation, constitute it an engineering achievement which is the marvel of this fearfully and wonderfully constructed human organism. When this apparatus—worn, dishevelled, deteriorated, disorganized—is presented for our remedial efforts, we must of necessity consider its engineering status and function; and our efforts if properly directed must be along the same lines and toward the same ends that nature has achieved in its construction and operation. There can be no doubt whatever, then, that engineering is another of the foundation principles on which we must base our efforts at oral restoration.

Not only must the body be nourished and strengthened for the practical purposes of life, but personal appearance is a matter of great importance in man's business and social relations and activities. In the matter of physical appearance the face is of chief concern; and located in the very center of the face is the dental apparatus. Probably no other organ or feature wields so great an influence toward making or marring facial harmony and expression. When the patient presents with nature's plans and purposes thwarted through deterioration, accident or loss it is the duty of the operator to establish harmonious conditions and relations as nearly as possible in accordance with nature's plans for the case in hand. All such matters having to do with cosmetic and esthetic values belong to the artistic side of our effort and their vital demands establish art as still another of the foundation principles on which we must base our efforts at oral restoration.

The putting into execution of these fundamental principles surgery, engineering and art is not a matter of theory alone and no amount of theoretical knowledge, unaided by technical skill, will suffice for its achievement. Inasmuch then as the operator must possess and bring into use his technical skill in every part of the undertaking—and inasmuch as the success or failure of his undertaking will depend in great measure upon the degree of excellence in the workmanship through which he carries out these practical details, and that this degree of excellence in the work-

manship will frequently be the measure of the success of his undertaking, workmanship becomes of vital importance and is thus established as the fourth of the foundation principles on which we must base our efforts at oral restoration.

I am aware that in this recital of details I have brought to notice some matters so elemental as to make them seem scarcely worth the repetition; but I have been so because I believe one flagrant cause of failure in all lines of endeavor is that men do not think the problems that confront humanity back to their simple and elemental beginnings and out to their definite and inevitable conclusions. Instead of digging down to bed rock of fundamental reasoning for the foundation that will withstand the storms and stresses of the forces that continually strive against it, we build upon the sands of inaccurate observation and inadequate thinking. Is there any wonder that, when the rains fall and the winds blow, our superstructures fail and fall?

One of our great faults and failures is that we minimize the importance of the simple and elemental things; we feel somehow that we have outgrown them and that they are beneath our dignity when, as a matter of fact, they constitute the very vitals of our professional achievement.

We have established then, (1) surgery, (2) engineering, (3) art and (4) workmanship as the four foundation principles on which we must base our efforts at oral restoration; and this is what I have called the four-square foundation which must underlie our efforts. There have been other attempts to state fundamental principles but almost invariably the so-called principles have proven to be but details of one or another of the principles I have here laid down. For example, one essayist has specified physiological status of the field of operation as a necessary preliminary; but a moment's thought will show this to be but a detail of the surgical program. Another insists on occlusion but occlusion is only one detail of the engineering procedure. So I believe it is with all matters pertaining to every side of oral restoration; analysis will show the four principles I have named—surgery, engineering, art and workmanship—to be complete and inclusive of all other details and so-called principles.

This brings us to our analysis of these vital principles in order that we may make a practical application of them to our undertakings. The limits of a single essay will not admit of carrying such an analysis to the minutest detail but I shall hope to proceed at least to practical lengths.

The first step in any surgical program comprises the cure or removal of pathological tissue and all products of degenerative processes, the correction of pathological conditions and relations, and the establishment of a physiological status in the field of operation. Applying this to the work of oral restoration we have a program which calls for the extraction of such teeth and roots as have become unfit for service or as constitute a menace to the systemic welfare, by reason of their own deterioration through disease or accident or because of the loss of contamination of their investing tissues; the treatment of all periodontic disturbances—pyorrhea, gingivitis, etc.; the sterilization of morbid periapical areas, the treating and filling of root-canals, the filling or inlaying of cavities, the correction by grinding or otherwise of traumatic occlusion and such corrections of malposition and abnormal relations as are practicable to the case in hand. With the field of operation freed from pathological conditions and a physiological status attained, as far as the circumstances of the individual case will admit, the further surgical effort may be considered under two heads: tissue conservation and prophylaxis. Such care as the case is presumed to have had to this point, has been merely preliminary to the actual work of constructing the restoration; and

the tissues, both of the teeth and their surroundings, that remain are supposed now to be in a state of health. When we come to the work of preparing the abutment teeth for the reception of the bridge-anchoring attachments it is obvious that some tooth tissue must be destroyed; but the ends of good surgery require that the least possible amount, commensurate with obtaining a secure hold for the attachment, be removed and that all tissue vital to the needs of the pulp for protection from external influences shall be conserved. For example, the shell crown, which has become the standard bridge attachment for posterior teeth in the practice of so many operators, necessitates the destruction of much more tooth tissue for its proper construction than does the inlay type of attachment. Good surgery demands that that additional tissue shall be conserved, if the mechanical necessities of the case in hand will admit of it. That is what I mean when I speak of tissue conservation as one subdivision of our surgical effort. The final division of our surgical program is prophylaxis, by which I do not mean mouth sanitation, with which term it is so frequently confused, but I have reference to its true meaning, prevention, which is to say, the construction and placement of such restorations, and in such manner, as that the tissues both of the teeth and their investments and especially the pulps that remain after the work of preparation is complete, shall be protected, as far as the influence of the restoration extends, from irritation, contamination and deterioration.

The second of our principles is engineering. Everything that has to do with service and efficiency—that is building for service and the utilization of the restoration in the production of service—comes under this head. Engineering may be divided, for the purpose of brief analysis into three parts. The first of these sub-divisions is the selection of the foundation. The one fixed and irrevocable thing in connection with bridge restorations is the strength available or attainable in the foundation. When we consider that in normal circumstances every tooth has its own foundation it is easy to understand that, in the case where some teeth are lost and their fellows are expected to support the structure made to take their places in service, however strongly anchored those remaining teeth may be, they constitute a foundation weakened to the extent of the number lost. In many cases it is further weakened by the loss of supporting structure about these remaining teeth. It is frequently possible to include additional teeth for anchorage purposes at one or both ends of the proposed restoration and by so doing to add greatly to the strength of the foundation, increase the usefulness and lengthen the life of the restoration. This is what is meant by selecting the foundation.

The second subdivision in the engineering program has reference to the handling of the foundation; that is to say, the preparation of each tooth or root, individually, in such manner as to conserve and utilize its greatest possible strength and so that the attachment constructed for it will exercise an unyielding grasp upon it. The type of attachment, whether internal or external, and the strain to be brought against the anchorage of the attachment in or on the tooth must previously be determined with reference to each tooth or root and each must be prepared in such form as that the attachment, once luted to position with cement, will not be dislodged by any stress normal to the case in hand.

The third subdivision in the engineering program pertains to occlusion; and here we have a matter directly related to the first subdivision—the selection of the foundation. Occlusal stress and foundation resistance are reciprocal forces and if we are going to produce both efficiency through the occlusal performance and durability in our restorations these reciprocal forces must be balanced or coordinated. Wherever occlusal stress over-

balances foundation resistance the ultimate result is the wearing down of that resistance, through overstimulation and trauma with the resultant tissue destruction and wreckage of the foundation, and consequently, of the restoration. Since this is inevitable, and since the available strength of the foundation is the fixed point from which we must work, that available strength must be our guide in occlusal co-ordination. Normal occlusion is productive of normal service when supported by a normal foundation, as in the case where no teeth have been lost; but that same degree of service or stress generated by such occlusal relations against a foundation weakened by loss of teeth, and frequently of supporting tissue as well, will, in many cases, be productive of strain, leading to trauma with its attendant train of evils. In such cases some way of altering the occlusal relations and of reducing occlusal stress must be found. Such reduction of occlusal stress will be at the expense, to be sure of part of the occlusal efficiency but this is a perfectly reasonable and justifiable state of affairs. It is unreasonable to expect, in any event, full efficiency from a weakened foundation. The suggestion is offered that there are several ways of reducing occlusal stress. Narrowing the occlusal surfaces below the normal; seeing to it that cusps are sharp and well defined; and in some cases leaving occlusal surfaces off entirely from one or more teeth, using facings only for the sake of the appearance. It cannot be too deeply impressed that the measure of strength and therefore of service is in the foundation; that we cannot enhance this beyond a certain maximum and that effort to produce for the patient more masticatory service or efficiency at the plane of occlusal contact than will balance the power of resistance inherent in any given foundation, will eventuate, sooner or later, in the destruction of that foundation. It is as inevitable as the working out of any other law in God's plan for the race. It is easy to see then of what vital concern engineering is in our scheme of things.

Coming to the third of our foundation principles, art, we find it simple enough of application if we comprehend its real meaning. Art has reference simply and solely to harmony, not to beauty as many might suppose, but to harmony. It has been said that the highest form of art is to conceal art. Our greatest service to our patrons from the esthetic point of view is to study the field of operation and its environment and to produce restorations in such keeping with them that their presence as substitutes for the natural organs will not be detected. That this is quite impossible of complete realization in many cases should not in any case deter us from keeping the goal before us as our ideal and reaching as far in that direction in every case as the circumstances of the individual case will admit. When we speak of harmony we mean harmony in character, conformation, size and color of the teeth; relations of the teeth; surface markings, especially those representing wear, erosion, etc., in cases where natural organs remain to be used as guides in these matters. Where there are no such guides the shape and contour of the face, length and fullness of lips, size of arches, age, complexion, habits, etc., of the patient all must be considered and influence our selection. We mean harmony also—as far as it is possible to attain it, between the materials used in the superstructions and their environments. Much more might be written, but these are the keynotes as it were—remembering that naturalness of appearance, and not beauty, is the desideratum except where the restoration is to be set amid beautiful surroundings. Even amid beautiful surroundings beauty does not constitute art simply because it is beauty, but because of its harmony with its environment.

The fourth and last of our foundation principles is workmanship. Surgery, engineering and art are all departments where theory without practice is merely

word without deed. Knowledge and understanding are necessary preliminaries, but they must find expression through the technical details of mechanical execution before they become realities; and this mechanical execution is the part that the workman plays in our program. This gives workmanship a place of tremendous importance. No chain is stronger than its weakest link. By the same token a combination of the greatest theoretical understanding and poor execution will not make good bridge-work, which is only as good as the execution after all. Good workmanship then, in all the departments of our undertakings is vital to the success of any restoration. Since this is true, it stands as a corollary that the simpler the methods employed and the fewer and simpler the details of construction, the better any workman can execute them and the greater the number of workmen who can execute them well. This constitutes a direct challenge to those types, systems and methods that necessitate the use of many parts, many and complicated details of construction and much paraphernalia. Most of these things are but commercial parasites on the body professional and I believe that ultimately we shall cleanse ourselves of their loathsomeness. Whatever makes for simplicity makes for greater accuracy and consequently for better workmanship at the hands of any operator; and for a greater proportion of operators capable of good workmanship.

Thus we have established our standard of perfection for bringing into being the productions that our responsibility as members of the healing art demands of us.

We know that the degree of excellence with which the details of all these foundation principles are put into execution is the measure of success of the finished product. And we know that the simpler these details are kept the greater the assurance of excellence in the workmanship. This seems to me to be the acme of simplicity as a set of rules or a standard of perfection to guide us in all our efforts. With these specifications before us it seems a fairly simple matter to look into the oral cavity, to analyze the conditions and relations found there, to co-ordinate our findings, to study the possibilities of the individual case and determine upon a plan of procedure. Through such an understanding as we should have from this elemental study of conditions, relations, desiderata and possibilities many of the perplexities and difficulties with which we have unwittingly surrounded ourselves should become matters of the past and oral restoration a pleasure rather than a burden.

It will be observed that I have not included in this standard of perfection any details of technic for any part of these operations. Principles are based upon matters of vital concern; they are unchangeable and should be inviolable. But technic is an expression of individuality, preference, opportunity and every man should be free to give substance and vitality to principles—to reach the goal of service to his patient, through whatever avenues of technic are most convenient to him or best suited to his purposes.

But if our efforts are to reach the plane and deserve the name of service our technic must be based on principles, or if you will, a standard of perfection. When we arrive at this stage—when we take ourselves more seriously as an integral part of the healing art, we will learn to care for the pathological processes that come within our responsibilities in the genuine spirit of service, the disorganized mechanism as a scientific achievement and the degenerated esthetic entity on the exalted plane of art for art's sake. Our material rewards will then be the reaction from unselfish performance rather than the paramount issue of purely business transactions. Only then will the servant be worthy of his hire!

THE RELATION OF ANATOMICAL FORM TO THE PRODUCTION OF FAVORABLE CONDITIONS IN CROWN AND BRIDGE-WORK

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THE anatomical form of the teeth and jaws, while conforming to the same general characteristics, differs widely in individual cases. The jaws or their alveolar processes assume a more or less true semi-elliptical shape, opposing each other within the mouth cavity, the long axis passing through the center of the face.

The size and shape of these arches are of great importance, not only to the dental economy, but also as a factor in determining the general appearance of the face; any interference in their development having much bearing upon facial harmony and other normal lines of beauty. These arches carry in normal adult life, thirty-two teeth of varying size, shape and function, while the external surfaces of the arches are covered by the gum tissues, the gingiva extending between the teeth into the interproximal spaces. The health of these tissues is of vast importance as will be considered later.

Nature has so designed the teeth that each one will efficiently perform its individual function in the process of mastication of the food. The incisors are wedge shaped with the base of the wedge at the gingival margin from which the labial and lingual surfaces converge to form a straight cutting edge.

The cuspids, also wedge shaped, but somewhat inclined to be conical, so constructed as to withstand stress in all directions, with long powerful roots, are admirably designed to perform their function of cutting, tearing and holding. The bicuspids and the molars with two and more cusps are designed to take care of the crushing, grinding process so necessary to the proper mastication of food.

The teeth, as the jaws, are arranged in the form of semi-ellipse, with the long axis between the centrals, the lowers on a slightly smaller curve than the uppers. The cutting edges of the incisors form a curved line from cuspid to cuspid, the line continuing with the buccal cusps of the bicuspids and molars to the third molar. The lingual cusps of the bicuspids and molars are within this line, the buccal cusps of the lowers interdigitating with the grooves between the cusps of the uppers. The line or plane in which the uppers and lowers occlude is not straight, but is curved so that in the lowers it presents a concavity, in the uppers is convex.

The teeth are all normally broader at a point near the occlusal than at the neck. They have therefore, as placed in contact in the arch, V-shaped spaces between them, called interproximal spaces. In these spaces lie the gingival tissues. These spaces vary in width with variations in shape and size of the teeth. The teeth being rounded on the proximal sur-

faces are in contact at but one point, the spaces therefore widening from this point toward buccal and lingual, to form embrasures. The position of this contact point, and its relation to the health of surrounding tissue is of the greatest importance, and especially from the standpoint of the present subject.

Our subject treats of the relation of anatomical form to the production of favorable conditions in crown and bridge-work. In crown and bridge-work we place in the mouth various appliances, some reproducing the lost or broken down crown of a single tooth and depending for retention upon the remaining tooth structure; others, continuous masticating appliances replacing one or more lost teeth, and retained by various types of attachments upon remaining teeth.

For the purpose of our present discussion, we must consider crown and bridge-work in two classes, one referring to single crowns, the other to bridges.

By "favorable conditions" we refer to those conditions which are essential to the continued comfort, usefulness and health of the teeth and their supporting tissues. It is not within our field to describe the various types of crown and bridge-work and decide on their merits or demerits, but rather to draw attention to some conditions affected by their correct and incorrect form. We will consider the relationship of the form of crowns and bridges to the soft tissues and the possible effect upon these tissues. We will bear in mind that there is a possibility in incorrectly shaping the appliance of producing undue stress upon the abutment teeth, and upon the supporting alveolar process.

Let us first consider the conditions surrounding a tooth which needs restoration by means of a single crown. Anterior or posterior, we have to deal with a broken down tooth, which has lost its original contour or form. Very often in anterior cases, the entire crown of the tooth is broken off. Generally the contact with the adjacent teeth has been lost, due to the loss of tooth structure. This will allow a movement or crowding of the adjacent teeth from mesial and distal, with a loss of the space originally occupied by the tooth to be crowned.

We all recognize that these conditions, if not corrected, will eventually result in that chain of pathological changes running through gingivitis to pyorrhea and loss of the teeth. In addition to these conditions, there may be a change by elongation of the position of the occluding tooth or teeth.

We must bear all these things in mind while constructing a crown to restore the function of the broken down tooth. First the occlusal surface of the opposing tooth or teeth must be corrected so as to be in the proper plane of occlusion. If this is not done one or two teeth will bear unusual stress in the lateral movements of mastication. If the adjoining teeth have crowded together so as to partially close the space of the broken down tooth, they should be forced into correct position, and held there until the crown is placed.

Regardless of type, the crown should be so adapted at the gingival margin as to avoid all irritation to the gingiva. Of course, actual impingement of the crown upon the periodontal membrane will cause irritation, and is never permissible. In addition, the form or contour of the crown must be arranged to protect the soft tissues. The normal tooth is shaped so as to do this, there being more or less flare or bell crown shape from the neck of the tooth toward the height of contour. In making a crown, this flare should be imitated and even accentuated in an effort to protect the soft tissues of the neck of the tooth from a direct impact of the particles of food.

On the proximal surfaces, proper contact with adjoining teeth is essential. The same rules govern the shaping of the proximal surfaces in crown and bridge-

work as those given to the profession in Dr. Black's works on operative dentistry.

He says (Page 295, Vol. 2): "The usefulness of a filling depends directly upon the form given the proximal surface. There is perhaps more failure of fillings attributable to imperfect work in this, than in any other one thing." What is true of fillings, is true of crowns. If the contact point is not properly restored, particles or shreds of food will lodge in the interproximal space and, crowding the gum away, form a pocket for lodgment and decomposition. This will result in caries of the adjacent tooth or teeth, and disease of the gum tissue and periodontal membrane. Attention should be given the form of the contact point and the position it takes in relation to the other surfaces and to the adjacent tooth.

The form of contact between two teeth should be similar to the contact of two spheres or marbles, there being but one point of immediate contact. From this point the surfaces should be so formed as to slope toward occlusal, gingival, and into embrasure, that will allow the food taking its normal course through these embrasures to buccal and lingual.

Upon the buccal, labial and lingual surfaces, height of contour must be established, so the sweep of food is directed as to make impaction impossible. Instead, the food in masticating must be so directed as to strike at a tangent, scouring the surfaces of the soft tissues. These tissues are thus stimulated, rather than irritated by impact.

The form of the incisal and occlusal surfaces has its relative importance. This surface must be so shaped as to articulate properly with the opposing teeth, in normal occlusal plane. In posteriors, cusps should be established in proper position, with corresponding sulci and grooves. The necessity of a properly-shaped occlusal surface so that the tooth can take its place with its fellows in breaking up the bolus of food is understood and should be observed by all who construct these appliances. The relation of the occlusal to the axial surfaces should be so arranged that the cheek and tongue are protected from injury in mastication. The marginal ridges and the cusps if properly placed will not pinch these soft tissues as the buccal and lingual height of contour should hold them away.

We have some different conditions to deal with, if teeth are missing, and a bridge is decided upon as the correct method of restoration.

The abutment teeth have at least one proximal surface which is adjacent to the space left by extraction of a tooth. At times we must use as a supporting tooth one with teeth extracted mesially and distally. This tooth must be especially protected, both against irritation to the surrounding gum tissue and against undue strain to its weakened bony support. Between the abutments, we have to deal with a span of the ridge from which alveolar process has absorbed. Where the teeth have been lost for any length of time, the antagonizing teeth in the opposite jaw are sure to have elongated to a greater or less extent.

To construct a bridge to restore the lost teeth, and to make it anatomical in form, should be and is recognized as an impossibility. To a limited extent only, regardless of the type of bridge, are we able to completely restore the shape of the lost teeth. The shape given the so-called dummies, or pontics, should therefore be called hygienic rather than anatomic.

Where we have elongation of opposing teeth, the normal occlusal plane must be restored, before proceeding with the actual bridge construction. It is impossible to build up the lost tooth contour if a great part of the gingivo-occlusal space is taken up by elongated opposing teeth, neither is it possible to construct a serviceable bridge, as the triturating motion, so necessary to proper function of the masticating organ, is lost or interferred with. With only one movement possible, opening and closing, the food

can be crushed, not ground. If a lateral motion is attempted, the only contact is on the cusps of the elongated tooth. In constructing the abutments for a bridge, the same conditions apply as when making a single crown, except that at least one proximal surface will be attached to the body of the bridge. At this point, the form of the work needs especial care. The gingiva is not normal here, and any irritation or impaction will lead readily to the formation of a pocket. The proximal surface of the abutment should be slightly overcontoured, and the dummy should be attached so that, to every extent possible the food can sweep through the embrasures. A solid contact soldered from buccal to lingual is sure to allow for collection of debris and more or less gingival irritation.

The body of the bridge, as mentioned before, cannot in many cases be constructed to anatomical form, but can only be made to approach tooth form to the extent that the nature of the appliance will allow.

The occlusal surfaces should articulate properly with the opposing teeth, and have such a form as will allow the food to be broken up in mastication, rather than caught on the bridge surface and crushed. The latter condition, in addition to being inefficient, throws undue strain on the abutment teeth and alveolus, and will soon result in pathological changes. Gateways must be formed between the dummies to imitate the embrasures between natural teeth. These will allow of proper mastication, and due to the sweeping action of the foods stimulate and clean the tissues of the ridge beneath the bridge.

The surfaces of the bridge adjacent to the tissues must be cleanly, and proper contour will tend to keep them so. These surfaces must be convex, so that the sweep of the food, and the motions of the tongue, lips and cheeks will have a cleansing action upon them. Concave surfaces not only resist this natural cleansing, but resist mechanical scouring.

Alignment with the other teeth in the semi-ellipse of the arch is another necessity. If the bridge be out of alignment it is impossible to adapt it to the various positions in mastication. Certain thrusts of the jaw are sure to bring a strain upon the supporting structures, that will soon destroy them and cause loss of the appliance.

As with crowns, the forms presented to the cheeks and tongue should be so arranged that these tissues are held a little apart from the actual points of occlusal contact, to protect them from being caught and crushed between the bridge and the opposing teeth.

It will be seen from a consideration of these facts that anatomical form has the most important relationship to the successful crown and bridge result, and that a cleanly, efficient and lasting piece of work can only be constructed by keeping in mind the anatomy of the teeth, and surrounding tissues.

Due to the nature of the work, we can only imitate this form, but the ideal must be kept constantly in mind.

RESUME OF ROOT-CANAL PROBLEMS AND A PRACTICAL ASEPTIC TECHNIC

By EDOUARD M. HALL, D.D.S., Kansas City, Missouri

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"THERE is in human affairs one order which is best. That order is not always the one which exists, but it is the order which should exist for the greatest good of humanity. God knows it and wills it; man's duty is to discover and establish it."

If the above quotation were ever applied to a given subject it surely is apropos to the root-canal problem. As a profession if we are even to keep pace with the onward march of civilization, let alone foster the ambition to discover truths in advance of our time, we must delve into those fundamentals of science that go to make up the sum total of that phenomenon called life.

No subject before the dental profession has been more widely and generally discussed in recent years than has the root-canal problem. I am fully aware that "all that is good has been said before, all that is noble has been thought before," but I challenge you, does there remain a less need for resaying the good and rethinking the noble? So it is with the root-canal problem; while some few have gone to extremes, the vast majority of dentists have as yet made little effort to meet the problem of scientifically treating and filling root-canals.

In meeting with the members of the dental profession in different parts of the United States, Canada, and Mexico, I have been impressed with, and depressed by, the evidence that the rank and file of the profession are still chiefly interested in reparative work upon the exposed portions of teeth and where a root-canal operation is undertaken it is still being done in much the same old way.

The distressing and most serious feature in this great problem is the indifferent and even antagonistic attitude taken by altogether too many operators toward easily proven and generally acknowledged principles of root-canal technic. One is confronted with the sad fact that the mere knowledge of the truth about root-canal work is not the cure for the evils thereof. "If to do were as easy as to know what to do, then all of us would mount to greater heights."

Our new responsibility as a branch of the healing art, having to deal with mouth infections in their close relation to systemic disease, seems to rest lightly upon the mind and conscience of altogether too many dentists. Many of these same indifferent operators have held up their hands in "holy horror" and loudly protested against the ruthless extraction of teeth, yet in their daily practice they are doing root-canal work in such an unscientific and careless way as to add justification to one hundred per cent vitality propaganda.

If I had to choose between the radical one hundred per cent vitality group of men and those thousands of operators who are still doing root-canal work in much the same way as of old, I would unhesitatingly join the one hundred per

cent vital group. This does not mean that I believe in the ruthless extraction of all pulpless teeth, as many of you well know, but of the two groups named they do vastly less harm.

It is universally admitted by practically all individuals and institutions worthy of recognition, that all pulpless teeth are not necessarily septic and therefore, all pulpless teeth *need not* be extracted. It is a source of great personal satisfaction to be able to tell you that many of those of so-called radical tendencies have largely modified their views and the number agitating wholesale removal of all teeth which have lost their pulps or which have exposed pulps, has markedly decreased.

As the subject of my paper implies, I think it well worth while for us to very briefly take a backward glance at the various stages or transitional periods in root-canal work. Let us observe and study conditions before and after our various struggles and encounters with the "Black Beast" of dentistry, as Dr. Fred Molt dubs the pulpless tooth.

In the years 1912 to 1915 when the disclosing power of the X-ray began to attract a widespread attention to diseased conditions about root ends of pulpless teeth, we as a profession, were surprised and chagrined to discover or have revealed how miserably we had failed in our attempts to fill root-canals. Naturally these discoveries were followed by a feverish activity in broaching and instrumentation to open up root-canals so that a filling could be accomplished that would make a good X-ray picture. During this time we were seeking some magic remedy, some heroic germicide which when sealed in a root-canal would destroy all pathogenic organisms and leave the tooth when filled in a satisfactory condition ever afterward.

Is it any wonder that this period of excessive instrumentation coupled with heroic drugs was accompanied by much soreness and suffering on the part of the patient, and in many cases the ultimate loss of teeth, so that the grief associated with root-canal work at this time was enough to discourage all but the dauntless.

Then in 1915 and 1916 Dr. Callahan and others brought forcefully to our attention the then discouraging facts about multiple foramina, and accessory canals, etc. At this time we were trying by heroic methods to clean out all these multiple formations with sodium potassium paste, sulphuric acid, etc. Arguing that you could not fill a canal until all organic matter was removed; then by strenuous pumping and plugging it was hoped to fill all formina, etc., with chlora percha, chlora rosin, and what not, believing that a considerable excess filling or so-called encapsulation was better than to fail to reach the root end. Some favored the use of H_2SO_4 and condemned sodium potassium paste, others believed in sodium potassium paste and condemned H_2SO_4, and so on down the list of the old classic remedies.

Then there were those who had not preached or proclaimed in favor of any remedy or method in particular but who earnestly studied and observed the situation and began to have doubts about the value of and merit in these methods.

In 1917 at the national meeting in New York City, we were told in a report from our research department upon the relative efficiency of medicaments for the sterilization of tooth structure, that no medicament sealed in an infected tooth would sterilize same and would after a few hours become septic itself; that where clinical results had seemingly been successful it was probably not *because of* but in *spite of* treatment used and was in fact a matter of toleration due to natural resisting powers of the patient. This was the period of greatest turmoil and at this time the so-called one hundred per cent vitality propaganda was at its zenith. However, this was also the turning point in the line of study and investigation. We began turning from heroic in-

strumentation and medication, to a closer observation of the biologic phase.

When the startling facts and conditions associated with the pulpless tooth were first revealed to us, we were distressed to learn that clinical examination and observation as followed in the past had failed to meet requirements. So the pendulum swung over to the extreme and we went through a period of ultra scientific laboratory research.

It did not take long to discover that the problems having to do with the reactions associated with living tissue cells could not all be answered by laboratory tests. As Dr. Noyes says, "Laboratory work can only clarify the principle upon which clinical judgment and procedure are based." The most valuable and the most hopeful developments in the pulpless tooth problem are the results of histological investigations that in recent years have gone beyond laboratory study to a correlated clinical observation of vital biologic phenomena.

For many years we have been told that the pulp had no recuperative powers, that it had neither resistance nor repair. Recent investigations seem to prove that, if the pulp is not overwhelmed by infection, it has both resistance and repair to a very marked degree. So much so that pulpotomy instead of pulp extirpation may prove to be the better procedure. Yet we believe the evidence favors the removal of the entire pulp to the natural constriction of the canal at or very near the cemento-dentinal juncture. Where this is done without injury to apical tissues either with instruments or drugs, it seems rational to believe that multiple foramina and coronary openings will be closed by a throwing down of cemental tissue and thus the tooth be left in a physiologic condition.

Instead of seeking germicides to seal in a tooth and thus destroy invading bacteria, the vital, biologic conception is to evacuate and remove, without tissue trauma, all septic matter possible and thus change the balance of power from infection to immunity. We do not wish to be understood as advocating or preaching antiseptic nihilism but we believe the lethal effect of most of the old classic germicides on the animal cells, with the clinical results of retardation and inhibition of the natural processes of repair, are becoming so well recognized that their use is contraindicated.

The chlorine preparations, or the so-called Carrell-Dakin remedies, in their aqueous solutions, in such weak dilutions as to have little value as germicides in laboratory tests, in clinical application seem to supply some element to living tissue cells that carry them from a condition of susceptibility to one of immunity.

We believe the evidence justifies the conclusion that the only pulpless tooth that can with safety be retained in the mouth is one having vital cementum and pericementum. Where these tissues have become necrotic either from infection, drugs, or trauma we believe it is a case of toleration where they are retained even though a process of sterilization is accomplished. Clinical observation seems to indicate that these sterilized necrotic root ends are susceptible areas for metastatic infection that simply remain dormant any where from a few months to several years according to the vitality of the patient and the element of chance infection.

This does not mean that all teeth presenting with a history of disease or radiographic evidence of involvement of supporting tissues, must necessarily be extracted, but it does mean that the evidence must favor the assumption that the periodontal membrane is still intact and the patient's health good and such as to make the risk of treatment justifiable.

The problem of greatest importance, as I see it, is not how to save teeth presenting with a history of disease, but how to handle new root-canal operations so as to prevent apical and periapical infection. Of course, prevention of the need of pulp extirpation through prophylaxis is the keynote of modern dentistry,

but during the rest of our lives and for many generations to come every practicing dentist will often be face to face with the necessity of either doing a root-canal operation or extracting the tooth.

Pulp conservation is a phase of the problem that is very hopeful in its outlook, yet it will require years of clinical history and observation to procure evidence that will be dependable guidance in our efforts to save exposed or nearly exposed pulps.

Applying the biological facts, as related to vital cementum and pericementum, we believe root resection, or apicoectomy, is an unscientific operation and is a matter of tissue toleration dependent upon the vital resistance of the patient. Until some technic can be perfected that will seal the dentinal tubuli of the resected tooth (as with metallic silver), without vital tissue damage, we believe, working under the Golden Rule, that results obtained do not justify the operation.

I do not wish anything that I may say to cause anyone to think that I do not believe in laboratory or other means of research for they are very valuable and are necessary as a means of checking up on clinical work, but in the final analysis any procedure or technic will have to stand or fall according to clinical results obtained.

I do not think for a moment that I know the correct answer to all root-canal problems, and I don't believe anyone else does at this time, and ten, fifteen or twenty years from now we will know little more than we do today unless our work is systematized and hundreds of skilful, intelligent men keep a very carefully tabulated series of clinical case records.

To give as proof for or against certain procedure or technic, deductions arrived at from X-ray studies of old root-canal work is not fair or just because the work was done under what we now recognize as very unfavorable conditions, where tissue destroying drugs were used and asepis was unknown. For example, an X-ray of a tooth with seemingly perfect root filling yet showing destruction of supporting tissues is no argument against root-canal work, because the condition was probably the result of heroic drugs and a lack of asepsis. We must make deductions from a mass of evidence from carefully tabulated records of work done according to present standards of easily proven better methods.

Summary

1. The value and importance of the vitality and health of apical tissues cannot be overstated.

2. No tissue destroying drugs are safe to use in root-canal work. Therefore, no pulp should be devitalized, as with arsenic.

3. Pulp extirpation should be performed under general anesthesia, nerve block or pressure anesthesia after treatment.

4. A definite point in a root-canal should be determined by measurement, at which to stop operative effort and all instrumentation must be controlled according to this measurement. The ideal place for this seems to be the cemento-dentinal juncture.

5. Decision as to the extraction or retention of questionable teeth should be based upon a most careful diagnosis, in which the health of the patient is a deciding factor.

6. Dental diagnosis requires a thorough knowledge and use of the X-ray electric pulp test, and transillumination, with every other aid that will help discover all teeth with non-vital pulps and determine as nearly as possible the condition of the teeth themselves and the health or disease of supporting tissues. (Where indicated the patient's physical condition should be passed upon by a medical practitioner.)

7. The protrusion of filling beyond end of root is very undesirable and should be avoided as much as possible.

8. Infection is probably the greatest

factor causing failure in root-canal work. Therefore the importance of

AN ASEPTIC TECHNIC

Infections in and about the root ends of teeth must come from one of two sources, either by metastasis or by direct implantation in and through the root-canal. Since a study of thousands of X-rays of teeth reveals the fact that almost all of these infections are associated with teeth upon which a root-canal operation has been performed or one in which caries has exposed, or nearly exposed the pulp, we believe it is logical to conclude that practically all periapical infections are the result of direct implantation in and through root-canals. Therefore, one of the most important things in root-canal work is a practical aseptic technic.

Fig. 1

Success in root-canal work requires, first of all, that the operator have within quick and easy reach an abundant supply of the many small instruments and materials that are to be used in the operation—all in an aseptic condition.

The variety and quantity of these instruments and materials calls for special provision and equipment to properly take care of them. The Detroit Dental Manufacturing Company is making a pulp-canal instrument case having many compartments which admirably take care of these supplies (Fig. 1). This case has a classified arrangement with the idea of quick and easy access to the diversified instruments and materials required, all of which when put into the case in a sterile or aseptic condition are kept in that state by the use of formaldehyde, provision for which is made in the case. Thus the case is not only a container of instruments and materials in the most convenient arrangement, but it is at the same time a means of keeping sterile and ready for use an abundant supply of all instruments and materials needed in a root-canal operation.

Fig. 2

All dressings, as well as instruments, must of course be sterile. For applying medicaments to or drying out carious cavities and pulp chambers we use absorbent pellets (Fig. 2), which are made in assorted sizes—small, medium and large. All of these dressings we dry bake as follows: they are placed in X-ray film boxes according to sizes then these film boxes without lids are placed in an ordinary Nabisco wafer tin box and the lid or cover put on, thus they are ready for baking, which of course must be in an insulated oven without direct contact with flame or heating unit (Fig. 3). A thermometer should be inserted so the bulb will be just above the box containing the dressings. The oven temperature should be raised to 265° F. for a minimum of fifteen minutes.

Care must be taken not to run the oven temperature above 270° F. at any time or dressings may be scorched and damaged. These dressings are prepared in quantity in this manner and then transferred to the Kerr pulp-canal instrument case and kept under formaldehyde.

Gutta-percha points are sterilized in quantity by dropping into tincture of iodin for five minutes, then into alcohol five minutes and then transferred to the Kerr pulp-canal case.

New broaches, particularly barbed broaches, are dangerous until tested by using; quite often a weak spot in a broach is not discovered until a part of it is left in a root-canal, so it is quite desirable to be able to use a good broach over and over again as long as it is effective. This has led to the development of the Kerr alcohol sterilizer (Fig. 4) which has three shallow wells for short or Style B broaches, three deep wells for long or Style D broaches, and a large central well for dipping mouth mirrors, rubber-dam clamps, etc., for alcohol flaming (Fig. 5). Scissors, pliers, pluggers, etc., can be dipped in deep wells for sterilizing and flaming.

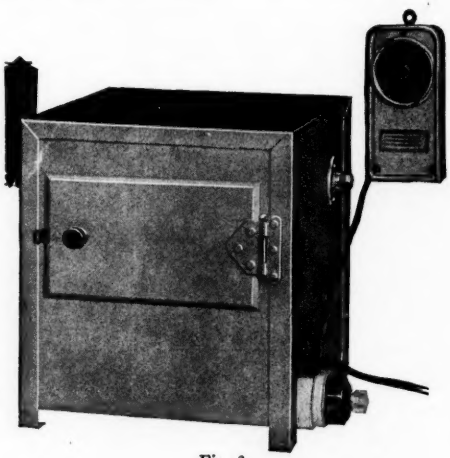


Fig. 3

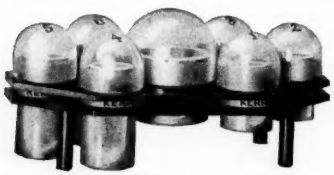


Fig. 4

When you make preparation for a root-canal operation you select a series of three succeeding sizes of broaches to be used and place at least four or five of each size in each succeeding well. The bottom of wells are oval so that points of broaches stand together in center and handles in a semi-circle about the circumference of the wells (Fig. 6).

It must not be conceived that the idea is simply to shake or dip broaches in alcohol for a second or two. The habit should be formed to take the broach standing nearest to you (No. 1 in illustration) from a well and, after using, to mechanically clean and replace it at farthest side of semi-circle (No. 5 in illustration) so that it will remain in alcohol until you have used in turn each

broach in front of it before you again use it, or a lapse of at least five or six minutes. This same routine applies to the use of short or Style B broaches.

Special emphasis and attention must be given to the mechanical cleaning of broaches before they are replaced in the alcohol bath. First, because the instrument is of little or no value for further use unless it is cleaned, and second, with a mass of bacteria left upon a broach the alcohol would coagulate the outer layer of protoplasmic cells and thus protect, for a longer time than five or six minutes, those cells in the center of the coagulated mass. In this manner five or six minutes in the alcohol would fail to sterilize the broach.

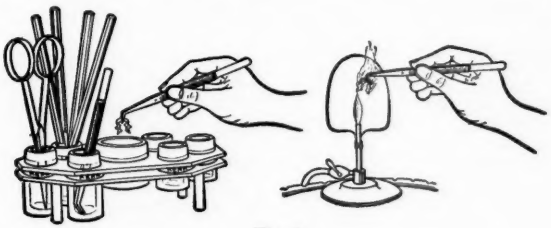


Fig. 5

It must not be forgotten that alcohol has a great affinity for moisture out of the air, etc., and you should systematically, by rotation, fill first from No. 1 all the other wells and then refill No. 1 with fresh alcohol. Then the next time fill from No. 2 all the other wells and refill No. 2 with fresh alcohol, then No. 3 and No. 4, etc. In other words, don't think that the same alcohol will retain its efficiency forever when exposed to the air and other changes. Each well has a ground glass neck and cover, numbered to match, so that you can keep them covered and preserve the high efficiency of your alcohol.

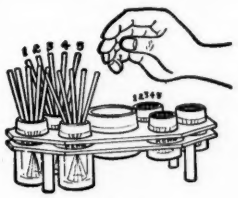


Fig. 6

Although 65 per cent to 70 per cent alcohol has greater germicidal efficiency, we recommend the use of 95 per cent grain alcohol in all wells to facilitate flaming and the use of alcohol in root-canals, etc. Modified solutions for separate special use make trouble in rotating alcohol from one well to another.

Before broaches, etc., are returned to the instrument case the handles should be dipped in alcohol and flamed.

Broaches ready mounted in long and short aluminum handles are much to be preferred over unmounted broaches.

The control of sepsis in the field of operation is best accomplished by first giving the entire mouth a thorough prophylaxis before starting root-canal work; then at each visit from the patient the mouth should be thoroughly rinsed and scrubbed with antiseptic solutions before applying rubber-dam, then tooth and dam should be painted with iodin, followed by fifty per cent sodiphene and field dried with alcohol.

CITY OF CHICAGO TO HAVE CHILDREN'S DENTAL INFIRMARY

By WILLIAM HALE THOMPSON, Mayor, Chicago, Illinois

(Read before the American Dental Association, Los Angeles, California, July 17-21, 1922)

AN INVITATION has been extended to me by the president and secretary of the American Dental Association to present a statement of the proposed plan for building and maintaining a dental infirmary for the care of children's teeth in the city of Chicago. Permit me first to express my appreciation of the compliment implied by this invitation, and to thank your officers for the courtesy of the privilege of appearing before you. That I cannot do so in person is to me a source of keen regret, a regret tempered only by the fact that even in my absence you are good enough to set aside a few minutes of your valuable time to listen to a plan which I confidently believe is destined to help to solve the very serious problem of caring for the dental needs of the great army of children who today are practically neglected in most of our large cities.

It is true that Boston has her Forsyth, and Rochester has her Eastman, while various other cities are proceeding in a more or less tentative manner to meet the situation. All of these efforts are laudable, and all are producing results. No commendation is too great for such splendid men as the Forsyth Brothers, and Mr. Eastman, nor for the self-sacrificing efforts that have been put forth by many worthy men in other sections for the amelioration of the sufferings of children from diseased teeth.

But what Chicago proposes to do is something different. It is our plan to collect from the community the necessary funds to establish and permanently maintain community dental service, and it is to be done in such a way that the community will be benefitted at the time of giving the money, as well as at the time of receiving the service.

In 1921, as mayor of Chicago, I conceived the idea of organizing what was termed a Pageant of Progress, to illustrate the advancement being made in the various arts, sciences and industries, whereby the people could be educated as to the development going on in the various activities of life, and thus stimulate to renewed interest in those things which make for their material welfare. The history of this Pageant is too long for recital here, but suffice it to say that it proved an overwhelming success, not only in its educational values, but in the financial returns after all expenses were paid. The amount in the treasury today is approximately $150,000.00. In the furtherance of this project I had the hearty co-operation of many worthy citizens of Chicago, notably Mr. D. F. Kelly, of Mandel Brothers, who is treasurer of the Pageant of Progress, Dr. John Dill Robertson, who was then commissioner of health, and many others. Owing to the manifold duties which devolved on me as mayor, and for other reasons, I felt obliged to give up the active management of the Pageant after the first year, and induced Dr. Robertson to take over the

work. This he consented to do and subsequently resigned from the health office.

Through this medium we are raising money from the community, at the same time that we are doing the community good; and the next consideration is how this money is to be expended for the benefit of this same community or for those most vitally in need of assistance.

It was Dr. Robertson's idea to build a suitable building in Chicago for the double purpose of housing a training school for home and public health nursing, and for the establishment of a dental infirmary for the care of the teeth of the needy.

In May, 1922, Dr. Robertson and I visited the Forsyth Dental Infirmary in Boston, and I became so impressed with what was being done for the dental needs of the children of that city, that I at once declared that we would come back to Chicago and *out-Forsyth Forsyth!*

A meeting was accordingly called the evening of June 6, at which there were present many of the representative dentists, physicians, and nurses; and when I had outlined our plans for this great institution the idea met with such a hearty and spontaneous endorsement on the part of those present, that I felt encouraged to venture the prediction that ground would be broken for the building not later than October of this year.

Briefly stated, our plans for financing this splendid philanthropy are to hold a Pageant of Progress each year with the positive assurance based on past experience, and the most conservative estimates for the future, that ample funds will be available for the maintenance, on a permanent basis of one of the best institutions of the kind in the world.

Thus it will be seen that while private magnanimity has inaugurated in other cities a most commendable movement for the alleviation of suffering among the children, it remain for Chicago to evolve a plan whereby the community itself provides the means, and does it in such a delightful way that it becomes a pleasure instead of a burden.

Mr. President, I commend to your consideration what we are pleased to call the Chicago idea for community dental service, and I bespeak for this movement the co-operative interest of every member of your splendid society. I thank you, sir, on behalf of the citizenship of Chicago for the spontaneous courtesy which prompted you to extend to me the invitation to appear before your Association on this occasion, and I am deeply grateful to your members for their consideration in so cordially accepting as a speaker one who is not a member of your organization.

May I also add that it is my earnest hope that some day in the future, when we have our institution in efficient working order, you will do us the honor to accept an invitation to hold your meeting in Chicago so that you may observe at first hand the practical operation of what today is our enthusiastic vision, and be able thereby to offer us suggestions, wherein we may improve this service to our children and bring it to the utmost point of perfection.

I realize better than most men the necessity of co-operation, and I am frank to admit that I do not believe that this movement can achieve the greatest measure of success without the endorsement and the active aid of the dental profession. We invite this aid in the fullest sense of the term, and be assured that with this idea in view as well as our general reputation for hospitality, you will always receive a hearty welcome whenever you may find it feasible to hold your meeting in the city of Chicago.

THE SIGNIFICANCE OF OCCLUSION IN PARTIAL DENTURE PROSTHESIS

By FOREST H. ORTON, D.D.S., St. Paul, Minnesota

(Read before the Minnesota State Dental Association, Minneapolis, Minnesota, February, 1922)

IT IS true that the successful practice of dentistry through whatever division of the science we may take as an avenue of approach, must have as its fundamental pre-requisite a thorough understanding of occlusion.

This is no private opinion of my own, but is everywhere recognized by students and practitioners. Dr. Kuggerman of New York says that "occlusion, although originally serving as a basis for orthodontia, is now becoming recognized as a basis for all dentistry." The National Society of Dental Prosthetists have made this subject the major problem for the society's investigations. And although periodontia is a comparatively recent development as a dental specialty, its students have been quick to appreciate the importance of occlusion. C. P. Wood of Detroit voices the majority opinion in this field, when he says that "malocclusion is responsible for more serious troubles in the masticatory apparatus than all other causes put together." "It means disease of the teeth and their holding tissues in direct proportion to the extent of the malocclusion." Orthodontia has of course long recognized occlusion as one of the important factors involved in diagnosis.

It is a somewhat significant fact, that not until Dr. Angle succeeded in impressing upon us that wonderful picture of the relation existing between the occlusal planes of the teeth; succeeded in showing us how the teeth must gain their normal relation if we would succeed in maintaining them in their corrected positions; proved to us what a waste of time it is to consider merely one arch in isolation from the other, or to ignore the relation that each tooth bears to all the other teeth in both arches—it is a significant fact that not until this was done, and the corresponding fundamenal postulate generally adopted, could the uncoordinated study of the irregularites of the teeth emerge into the scientific specialty of orthodontia. Its present scientific status makes it hard to believe that even as late as 1903 it was necessary for Dr. Angle to emphasize such simple and elementary considerations as the following: He said, "I shall try to make clear some principles which seem to me basic, on the intelligent apprehension and application of which depends the possibility of successful achievement. First I hope to demonstrate that we must consider the dental apparatus as a whole in each case, together with the throat and nose and facial lines, instead of limiting our attention to local symptoms in the form of one or more crooked teeth, as has long been the practice."

The point I wish to make in citing

these opinions and quotations is that the orthodontist and the partial denture prosthetist, while differing in method, have a strikingly similar aim that is fundamental to both: the correction of abnormal, and the maintenance of normal occlusion.

With the exception of those comparatively uncommon cases where the teeth have been recently extracted, it is a rare experience to find an arch line which has been broken by the loss of one or more teeth, where there has not resulted a greater or lesser degree of malocclusion, accompanied by more or less change in the relation of the mandible to the maxilla, the degree of the change depending on the age of the patient and the length of time the teeth have been lost. Looking at the subject from this point of view, our major problem seems to be to obtain a clear idea of our aim, based upon a recognition of fundamental principles. Questions of method, while important in their place, questions of whether we should use a removable bridge or a partial denture, for example, are not so important as this primary question of aim and fundamental principle, which must first be cleared up before matters of method can be understood in their proper perspective. All detailed methods of treatment offer us something which is more or less of a compromise as compared with absolutely normal functioning, and give us a choice of the lesser of more or less flagrant evils. In proportion as we come to understand more fully the broad meaning of the term normal occlusion the better will we be in a position to overcome or minimize these evils, and thus answer the challenge which the times have hurled at partial denture prosthesis. The principles advanced by Dr. Angle 19 years ago, as a basis for orthodontia, might well be restated today, as the basis for a study of the principles of partial denture prosthesis.

I believe you will agree with me when I say that there is no field of restorative dentistry in which we are confronted with so great a variety of unfavorable conditions as where the mutilated arch suggests a restoration with some form of bridge-work. And yet our diagnosis rarely takes these unfavorable conditions into account in a thorough-going manner, or in such a way as to consider their wider implications. Speaking for myself in this matter, I may say that in the past I have concentrated my ingenuity on the problem of how best to apply my favorite form of bridge. But through a process of trial and error, mostly error, I have come to realize that I need some accurate method for the study and determination of the changes that inevitably take place in the arch following the loss of one or more teeth. Before we can prudently and rationally decide on what appliance it is best to use in a given case, I think we need to know the precise nature of the difficulties that have to be overcome, the changes that threaten, and which have to be prevented, the abnormal conditions and tendencies that have to be counteracted. It is frequently said that the many variations presented by the mutilated arch constitute an insuperable obstacle to the discovery of any classification or method of diagnosis that shall be comprehensive enough to be of any value for teaching or practice.

The very same objection was urged against Dr. Angle's classification of cases of malocclusion, and yet time has demonstrated the futility of the objection, and the fundamental utility of such general points of view as a classification gives. The determination of the particular class under which a given case of malocclusion comes is now the first step in diagnosis. It is impossible to overemphasize the logical truth that only he who has the general idea, the principle, the

class, the type, is adequately equipped to deal with the individual variations.

In crown and bridge practice we have adopted the practice of making a study model; but these models are far from having the significance for us that they might have. This is because we lack the comprehensive classification which guides the orthodontist in his interpretation of similar models. We have adopted his method, but we have not yet extracted from it its full scientific value. We follow the method mechanically and blindly, instead of intelligently and with our eyes open. This is especially true of the young student, who sees only what he has been trained to see. In common with other colleges, ours has adopted the practice of requiring the student to make study models. The significance of these models is usually that they may be stored by the student in his locker, to be produced when called for, to show that he has actually performed this part of his required work. However, a student will sometimes develop hidden traits, even the trait of inquisitiveness. On more than one occasion I have been embarrassed by having the student say: "Now that I have made these models, what shall I do with them?" Even the squelching reply that they should be studied, of course, does not always dampen the student's ardor for knowledge. They sometimes come back with the further question: "What particular thing about these models am I expected to study?"

In the hope that a comparative study of a large number of such models might uncover a number of points of view for their fruitful study, and furnish me with data that might help me to answer such questions as the above, and perhaps prove the feasibility of a classification to aid in the diagnosis of the mutilated arch, I collected a large number of student models, and added to them my own collection, until I had upwards of 850 all told. For convenience of study and comparison, these were placed in separate rows on long boards supported upon two saw horses. In the first few rows were placed those casts showing loss of teeth from the lower arch only, then casts showing loss of teeth from the upper arch only, and finally those showing loss of teeth from both arches. Of these 850 casts 430 showed loss of teeth from both arches, 310 from the lower only, while the other 110 were mutilated in the upper only. Of the 310 showing a mutilated lower arch only, 182 or 59 per cent had lost the lower first molar; 79 or 25 per cent had lost a bicuspid, usually the second; 41 or 13 per cent had lost the second molar; 6 or 2 per cent had lost one or more incisors; and 2 or 1 per cent had lost cuspids.

Of the 110 casts showing losses from the upper arch only 60 or 55 per cent showed loss of bicuspids; 20 or 18 per cent showed loss of first molar; usually on one side only; 8 or 7 per cent showed loss of second molar; 9 or 8 per cent showed loss of incisors; 2 showed loss of cuspids; and 1 showed loss of cuspids and incisors.

If these statistics may be taken as a guide in showing what we may expect in the routine practice of the average dentist, then 59 per cent of all the bridges made are designed to replace the lower first molar, frequently also including the second bicuspid; and 55 per cent of all bridges in the upper arch are made to replace the upper bicuspids. We have probably all realized these proportions in a vague and general way, in connection with the demand for fixed bridge restorations; but these statistics give authoritative backing to what was formerly mere opinion. And it is by no means unimportant to remember that over one-half of the conditions indicating some

form of bridge-work involve these particular segments of the arch.

The next step was to make a comparative study of the changes resulting from the loss of these particular teeth. If the problem were merely to fill a gap in the arch, as one who replaces a brick in an otherwise intact arch, the problem would be simple. And if we only needed to obtain occlusal contact with the two arches in central occlusion, the diagnosis would again be a simple matter. No special knowledge other than that possessed by the average high school student would be necessary for the purpose. Or if the effect of the commonly observed changes, such as the tipping of the teeth adjacent to the space, and the elongation of the opposing teeth—if the effect of these changes were limited to the same segment of the arch, and if the structural lesions due to the malocclusion of the tipped and elongated teeth were the only factors involved, the diagnosis would again be comparatively simple. But this is very far from being the case. The statistical study referred to has convinced me that we are woefully lacking in facts and points of view necessary as a basis for diagnosis. But a few somewhat isolated and yet interesting facts emerged from the study.

(1) The changes resulting from a loss of upper teeth are slight, as compared with the changes resulting from a loss of teeth in the lower arch.

(2) Assuming that the occlusion was initially normal the teeth adjacent to the space in the lower arch will converge toward each other. In the upper incisor region, however, the teeth will be somewhat divergent. This is especially true where the cuspids have been subjected to additional strain due to the loss of teeth posterior to them.

(3) Assuming that the casts were made from the impressions of adult mouths, many of them past middle life, as judged from the occlusal abrasion, it was impossible to judge in the absence of any accompanying history of the case, what part of anomalies of arch form and malocclusion or abnormal antagonism was due to inharmonious development of the jaws, and what part was due to the loss of lower molars and bicuspids later in life, or possibly to a combination of both factors; that is to say, it was impossible to judge with any considerable degree of certainty.

But it is certainly a significant fact that the loss of the first lower molar and lower second bicuspid, showed with very few exceptions, a degree of change in the relationship of the two arches, its magnitude depending on the age at which the tooth was lost, the time elapsing since the loss, the bony development, habit and so forth. Abnormal antagonism was rarely limited to only one or two teeth, usually involving several, and in extreme cases, all of the teeth.

(4) To emphasize the bearing of these facts on crown and bridge-work, I wish to quote B. F. Lischer of St. Louis, one of the outstanding orthodontia specialists in the country. "Malocclusion," he says, "always means abnormal function, and invariably leads to structural lesions. It may be stated axiomatically that only a normal mouth can perform normal functions. And by a normal mouth we mean a mouth of normal architectonic form, as well as one free from disease." In proportion to the degree of malocclusion involved, we may therefore expect to find more or less of gingivitis, and various forms of pericementitis.

(5) Lack of function is productive of retrogressive changes in other organs of the body. The teeth and jaws are surely not exempt from a process which undoubtedly exercises an influence over general growth and development. Much has

been written, in the literature of orthodontia, on the effect of what is known as disto-occlusion upon the growth of the mandible and other facial modifications. To quote Dr. Lischer again: "The growth of the body of the mandible is frequently affected in disto-occlusion, and in some instances the rami-condoloid processes, and even the glenoid cavity, are involved to such an extent that more accurate methods of diagnosis will eventually remove many cases from the group." The necessity of accurate methods of diagnosis, based upon an intimate understanding of the anatomy and physiology of the head, face and jaws, cannot be over-estimated.

Facial deformities in the lower third of the face, such as are common to middle life and after, though often also seen in youth, are the result of some change in the relationship of the jaws, and may frequently be regarded as the indirect result of the loss of teeth from the arch, with the implied changes of structure and function operating to intensify one another through a longer or shorter period of time.

While the disto-occlusal relationship described by Dr. Lischer, may be due to arrested development, it is an interesting fact that as a result of long standing malocclusion frequently seen in a mutilated arch, retrogressive changes take place that present objective symptoms strikingly similar to those described by Dr. Lischer.

I think I am justified in the statement that one phase of this vast subject of occlusal reconstruction stands out very prominently, namely: That with one notable exception all dental research thus far conducted is entirely inadequate to warrant our adopting it as a basis of diagnosis.

Our study models must be mounted so that their occlusal contacts bear the same relation on the instrument that they do in the mouth, in order that we may study from every side the malrelation of the teeth exactly as they are in mouth, not only in central occlusion but all its range.

We must have an accurate method of measuring the changes that have taken place in the arch line, changes that are frequently remote from the initial break in the arch, but which are nevertheless a symptom of the malrelation thus produced and like many symptoms tend to recovery when the cause is removed. Secondary complications may necessitate and be benefited by planing the roots and treating with iodin, but where the initial cause was malocclusion only the removal of the cause will effect a permanent cure.

Science may be defined as classified knowledge. A classification based on measurements obtained from casts mounted as described above has been proposed by Dr. C. K. Bird of St. Paul, and while he presents it merely as a tentative classification, it is well to remember that if we never make a start, we will never reach the end.

All cases for diagnosis, mounted with a transfer to the four-inch radius mounted cases are by Dr. Bird divided into three main classifications:

Class 1: Posterior leg of the triangles less than four inches and the occlusal surfaces of posterior teeth raised above normal arc, found in cases of underdeveloped mandible and showing a decided condyle thrust—also in cases showing loss of mal-position of upper molars.

Class 2: Posterior leg of triangle more than four inches or posterior teeth below normal arc found in cases where has occurred the early loss of lower molars, undershot cases due to absence of upper cuspids or other malformations.

Class 3: The posterior leg of triangle on one side is more than four and on the other less than four inches—in other

words, posterior teeth above normal are on one side and below on the other, found in cases where a combination of the foregoing conditions exists. Fixed reconstruction of Class 1—impossible to reproduce normal arc on instrument—a balance range of occlusion can be produced by reducing radius. Class 1 is most difficult to reconstruct.

Fixed Reconstruction of Class 2: It is possible to reproduce normal arc and radius on instrument and the most favorable type which to establish a balanced range of occlusion.

Fixed Reconstruction of Class 3: Some extraction often necessary. It is sometimes possible to make a Class 1 case of Class 3. Usually more compensation in establishing arc and the resulting range of occlusion is in direct ratio to amount of correction attempted.

To quote a trite aphorism of the medical profession "to know the cause is half the treatment."

It is a biological truth that it is function that creates the organ. It is a pathological truth that the disturbance of function is responsible for the organic lesion.

Exhaustive researches governing the principles of occlusion have been presented by Dr. Munson. The treatise of a master needs no commendation through the words of a mere learner, except to say that he has thrown a light on the functions of the teeth heretofore neglected. He has demonstrated not only the meaning of balanced occlusions, and their function in maintaining the mandible and its dependent structures in normal relation, but he has shown the way to the banishing of that appearance of senility accompanying lost facial dimension.

The benefits to be expected by merely closing the space and possibly obtaining occlusal contact when the teeth are in central occlusion is of doubtful value and hardly justify the pain and expense that necessarily accompany the making of the modern attachment on vital abutments.

I fully realize that the foregoing statement is a severe commentary upon our crown and bridge practice, but I hasten to add that as a former head of the Crown and Bridge Department of the University of Minnesota for a number of years, I feel the responsibility for having perpetuated this practice to each succeeding class.

On the other hand, where the restoration (be it a fixed or removable bridge or a partial plate) is designed with a view of preventing or correcting malocclusion (I here use the term occlusion in its broadest sense), we are going in the right direction to answer the challenge that has come to this division of restorative dentistry, and to advance the slogan: "Add ten years to life."

RULES WHICH SHOULD, IN GENERAL, GOVERN WHEN DECIDING WHAT METHOD TO EMPLOY FOR THE RESTORATION OF MISSING TEETH

By THOMAS P. HINMAN, D.D.S., F.A.C.D., Atlanta, Georgia

(Read before the American Dental Association, Los Angeles, California, July 17-21, 1922)

I SHALL first approach this question from the standpoint of methods in general and then endeavor to indicate specifically certain points to be avoided. The first consideration should always be the location of the teeth involved in the replacement which will, to a certain extent, govern the character of attachment to be used. The condition of the supporting structures in the teeth used for abutment always has a direct bearing on the character of attachments. This condition should be revealed by good X-ray pictures.

Again, the occlusal relation of the mandible to the maxilla and vice versa is always a matter of prime importance. Also the condition of the mucous membrane in the area where missing teeth are to be supplied, as well as the tissues that surround the gingival border of the teeth that are to be used for abutments should always have careful scrutiny.

It is a difficult matter to set down a hard and fast rule which must govern methods for the restoration of missing teeth because the methods involved must, to a great extent, be predicated not only on the things heretofore enumerated, but also on the type of patient who is to wear the artificial substitute. Patients of the careless type who never follow directions as to cleanliness are better off where a piece of fixed bridge-work is applied than if the missing parts be replaced by a removable piece of any character. Often this rule is violated and a removable bridge placed in the mouth of a patient who gives little, if any attention to the proper cleansing of the parts, and as a result, not only are the teeth to which the bridge is attached injured, but also the mucous membrane underneath the saddle is, to a considerable extent, thickened and inflamed. On the other hand, this same piece of work placed in the mouth of a patient of the opposite type will prove not in the least injurious to the surrounding tissue but will be thoroughly sanitary and satisfactory. Therefore, the individual equation must always be taken into consideration.

As a general rule, the pulp of vital teeth should never be removed for the purpose of using teeth as attachments for bridge-work, although there are a few rare exceptions to this statement. With our modern methods and many satisfactory forms of attachment for inlays, hoods or crowns which may be used on vital teeth, it is seldom necessary to remove the pulp for the purpose of preparing the tooth to receive such attachment.

In the restoration of missing teeth, no device should be made which contemplates setting a band underneath the margin of the gums. The band is found to be rarely, if ever, indicated. In many instances, where large removable, or fixed bridges have been made for restoring

missing teeth, a partial denture with a gold base so constructed as not to impinge on the gingival border of the gums surrounding the remaining teeth, has been found more satisfactory than the complicated and expensive removable bridge constructions. As a general rule, it is preferable for the remaining teeth to carry only the stress that is normally their function and any device that tends to create this condition should be used.

The general application of the cast clasp on natural teeth has proved in many instances very disastrous. It has been my observation that breaking of the enamel, due to decay, will frequently take place under such clasps, in fact, it is only in rare instances that the enamel will not break under these clasps. If it is found necessary to clasp a tooth, it is far better to put a shoulder crown on it or, if an anterior tooth, a porcelain jacket crown, thus preventing the unusual wear and disintegration that so often follow the application of a clasp. Broadly speaking, clasps are not indicated on natural teeth that is, the type of clasp that fits snugly and around a major portion of the tooth.

It has also been found that fixed bridge-work which has for its attachment inlays at either end is not so satisfactory when both inlays are soldered to the bridge. The larger inlay should carry the bridge and an extension should be cut into the inlay of the smaller type and a finger, or pin rest in the occlusal surface so as to take care of the individual movement of the abutting tooth. If both inlays are soldered to the bridge, it has been found that in a short length of time the individual movement of the teeth so inlaid will cause one, or both ends to loosen. If the bridge is attached only at one end and the other allowed to rest in or on the other inlay, it is a much more secure device.

No device of any character should be placed in the mouth unless it is so constructed that the patient can, with ordinary attention, keep it clean. So many devices for the purpose of restoring missing teeth are put into the mouth constructed in such a manner that it is practically impossible for the patient to keep them reasonably clean.

Fixed bridge-work is just as clean as is that of the removable type if it is properly constructed and has equal attention with that of the removable bridge. In the anterior portion of the mouth, both above and below, the construction of proper hoods has made the restoration of these teeth comparatively simple, and the older method of destroying the pulp and putting the pins into the root-canals is to be utterly condemned.

The use of the old-fashioned open faced crowns, while still in existence, is too archaic even for discussion. It has proved an absolute failure.

In summing up an answer to the query, what general rules should govern methods for the restoration of missing teeth, I would say that in each individual case, the dentist must use judgment and experience as to the best method to apply.

THE TREATMENT OF EXTREME CASES OF MALOCCLUSION AND DENTO-FACIAL DEFORMITIES AFTER THE DEVELOPMENTAL PERIOD

By A. C. ROHDE, B.Sc., D.D.S., Milwaukee, Wisconsin

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

THE practitioner who has not had a large experience in the treatment of extreme dento-facial deformities after the developmental period, can easily be misled by the hypotheses and theories advanced by orthodontic writers and teachers of today.

Never has so much been written concerning the diagnosis, treatment, retention and prognosis of certain types of malocclusion in which it was necessary to change the relation of one arch to the other, as we find in reading the orthodontic literature of the present time. What is of significant importance is the fact that men are beginning to admit that their methods of treatment and the prognosis in many of these cases were not as successful as they at first believed. The causes attributed to these failures have been various, and the plans of treatment have been contradictory. We have only to read Case's article on "Principles of Retention" in which he says that he found it an easy matter to move teeth by intermaxillary force, and yet in Dewey's editorial in the May issue of the *International Journal of Orthodontia*, he says that intermaxillary rubbers do not move the teeth. Again, there are advocates who claim that in treating disto-occlusion, the temporomandibular articulation is changed, while as many hold the view that the mandibular teeth move forward and the condyle remains unchanged.

Some years ago, Federspiel made several dissections of this joint, the results of which he outlined before the American Society of Orthodontia. The past winter we have again taken up this study of temporomandibular articulation, and have found that in the infant and during the period of deciduous teeth, the glenoid fossa is nothing but a horizontal plane upon which the condyle rides, and yet, in some cases, we have found a marked development of this joint at this age. It is at this period that the distal relation of the lower arch may be formed, although we find mal-relation of the arches at birth varying in marked degree.

Probably one of the most important causes that create this deformity is nasal stenosis. The inequality of muscular action will hold the jaw distally, and thereby create the formation of a glenoid fossa over the condyle distally from what should be normal. If the cause of this pathological condition is not remedied, the result will be an anatomical displacement of the temporomandibular articulation, and the deformity with

which all of us are familiar becomes firmly established. It is important that dentists should give this subject deep consideration in order to advise their patients that early orthodontic and rhinological care is of inestimable value, and the prognosis favorable, if treated during the period of tooth eruption.

In the treatment of disto-occlusion, as classified in the classification of arch mal-relation, we have found that by arch expansion and the use of intermaxillary force, our results were very satisfactory if treated during the period of tooth eruption. But whenever we treated cases according to this method after the developmental period, although results seemed splendid at first, after a time there was a gradual shifting of the teeth back to their original position. There is also a danger in these cases of producing a bi-maxillary protrusion in bringing the teeth in normal occlusion.

The cases to which I will refer are those wherein early treatment was neglected, and at an age when the malocclusion was firmly established, and we cannot hope to expect such artistic results as can be obtained during the period when the jaws can be molded and the primary cause removed.

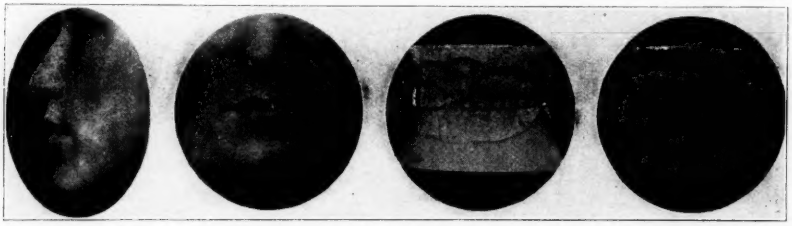
I recall a patient twelve years of age, who was treated in our clinic. There was disto-occlusion and protrusion of upper anterior teeth. Her adenoids were removed after the malocclusion had been fully formed. She was put under orthodontic treatment, the upper arch widened, upper anterior teeth retracted, and lower arch shifted mesially with intermaxillary force. The case was two years under treatment, the results splendid, and relation of teeth normal; yet it was impossible to hold the teeth in their new positions. We then came to the conclusion that this was a typical case where orthodontic treatment was begun too late to establish ideal results. We were firm in our belief that the distal displacement would not permit us to hold the jaw anteriorly so that there was a normal relation of the inclined planes. After considerable discussion we removed the maxillary first bicuspids and retracted the six anterior teeth. The time of treatment was short, and the result we know now will be permanent, judging from our experience of cases treated in this way.

Treatment in this type of deformity is done this way if the patient is put under our care during the developmental period. Fortunately, the patient in this case had a well-formed chin, so that when we retracted the six anterior teeth, the facial outlines were well balanced. This leads me to call attention to the fact that, as Lischer has pointed out, it is important when we attempt to treat these deformities, that we must take into consideration the study of facial outline with the relation of the inclined planes, in order to make ourselves safe in our orthodontic judgment.

For instance, a case may possess a malocclusion wherein the arch relation is normal, but the teeth are crowded and in malposition, and yet the nasal channels normal, and facial outlines good. If such a case should be treated by moving the teeth in their correct normal mesio-distal relation, we can remedy one deformity and create another. Let me, for example, cite a case that came to our clinic and was put under our care, a report of which was made in the June issue of the *International Journal of Orthodontia and Oral Surgery.*

Miss K., a young high-school girl, fourteen years of age, weight 125 pounds, came to our clinic for orthodontic care. Her general health was good, breathing normal and no enlarged

tonsils or adenoids. Her jaws were fully developed, all permanent teeth, with the exception of the third molars, erupted. Her facial outlines were considered normal. The maxillary canines were infralabio version, the mandibular left canine in labio version, the right mandibular canine in linguo version, and the anterior incisors crowded, the premolar and molars having shifted mesially. The case was diagnosed as one of complex neutro-occlusion. We could not bring ourselves to believe that if we enlarged both arches to make room for the canines we could, in all justice to the patient, preserve her individual normal. The treatment consisted in extracting both maxillary and mandibular first premolars. Anchor bands were then fitted on the first molars with spurs soldered to the buccal surface, and the soldered lingual arch resting against the lingual surfaces of the anterior teeth served as secondary anchorage. Bands with a labial spur were fitted to the canines, to which rubber elastics were applied and snapped to the spurs on the molar anchor bands. In this way the canines were gradually brought into place. After this had been accomplished the appliance was removed and reconstructed with power tubes and labial arch, and the rest of the teeth brought into alignment. No retainers were worn, the teeth retaining themselves. Figures 1 and 2 show the profile and front view before treatment. The facial lines are not distorted.



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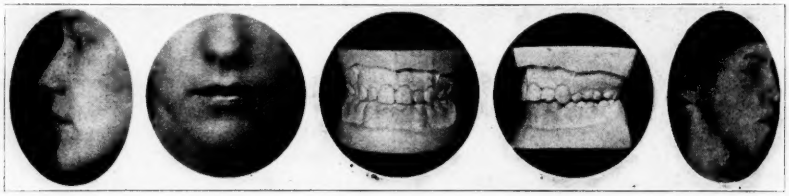
Figs. 1, 2, 3, 4.—Figs. 1 and 2, profile and front view before treatment. Facial lines not distorted. Figs. 3 and 4, side and front view of cases before treatment. Note malposition of teeth.



5 6 7 8 9

Figs. 5, 6, 7, 8, 9.—Figs. 5 and 6, case one year after orthodontic care. Figs. 7 and 8, front and profile of patient one year after orthodontic care. Fig. 9, bimaxillary protrusion.

Figures 3 and 4 show the side and front view of cases of teeth before treatment. Note the malposition of teeth. Figures 5 and 6 show the case one year after orthodontic care. Figures 7 and 8 show front and profile of patient one year after orthodontic care. Had we expanded and enlarged the arches without extracting the first premolar teeth, this condition would then have distorted the facial lines, because the enlarged arches would be out of harmony with the contour of her face. (See Fig. 9.)

The reason for restoring to what some might call "radical orthodontics" was that a similar case had been treated by us a number of years ago without extraction. This case was a neutro-occlusion, with a well-balanced face, yet the teeth were crowded and in malposition, and no evidence of nasal stenosis. The malocclusion was corrected without extraction, and a splendid mesiodistal relation of the teeth obtained, but, unfortunately, there had developed a bi-maxillary protrusion, distorting the facial outline. The parents were very much dissatisfied and felt that their daughter's facial outlines had been distorted. They were told that according to orthodontia, a normal mesiodistal relation of the teeth would, in time, establish a normal facial outline. As the years passed, both the patient and we have been patiently waiting for this to happen, but in vain. Fortunately, she is now married, and has become accustomed to her present facial deformity, that was produced by what was supposed to be correct orthodontic treatment.

In many cases of dento-facial deformities where the lower arch is distal to normal, the lower teeth, resting against the lingual surfaces of the upper anterior teeth, may produce an overdevelopment of the alveolar process surrounding the protruding anterior teeth, and the teeth will flare out fan shaped. This condition is usually established in adult life. The mal-position of such teeth, unable to functionate as they should, will undergo tissue changes of the pericemental membrane, and gingival pericementitis is the usual sequence. This infective process not only will cause the teeth to become lengthened, but the entire gum line appears hyper-

10 11 12 13 14

Figs. 10, 11, 12, 13, 14.—Figs. 10 and 11, pronounced disto-occlusion complicated by extreme labio version of upper anterior teeth with excessive formation of alveolar process. Fig. 12 after protruding mass in upper jaw was removed, the cuspids shifted distally to take place of extracted first bicuspid. Muco-periosteal flaps were trimmed down so they could be approximated. Fig. 13, four artificial incisors inserted in form of bridge-work extending from cuspid to cuspid. Fig. 14, front view of patient after operation. Note closing of lips without effort and slight wrinkle of vermilion border of each lip.

trophied. Once such a pathological condition is established, surgery, combined with orthodontic care, is the ideal treatment.

Figures 10 and 11 show a pronounced disto-occlusion complicated by extreme labio version of the upper anterior teeth with excessive formation of the alveolar process. This patient was treated by Dr. Federspiel and reported in the *International Journal of Orthodontia and Oral Surgery.* The four upper incisors were extracted, the protruding alveolar process was removed. This was done by stripping the soft tissue from the bone, and then with the aid of a surgical engine the entire protruding mass was cut away. (See Fig. 12.)

Figure 13 shows the artificial teeth inserted in the form of bridge-work extending from cuspid to cuspid. Figure 14 shows the front view of the same patient after the treatment.

The question in the treatment of these cases must be decided by the age of the patient, the etiological cause, and the features of the face, because in all classes of dento-facial deformities there are many variations, and to say that each and every one of these can be treated according to a prescribed method, without taking into consideration all of these factors, is preposterous.

Discussion

Thomas L. Grisamore, Chicago, Illinois: A few years ago we were taught that there was no necessity for the bodily movement of teeth. Some of our leaders in orthodontia insisted if we would bring about normal occlusion, nature would do the rest regardless of the tipped position of the teeth, or the age of the patient. While today there are constantly being placed on the market appliances for moving teeth bodily, and their use is advocated universally, it is my belief that you seldom need to move teeth bodily in children under twelve years of age. The teeth may be tipped when the case is completed, but they will straighten up in the vast majority of cases. In older cases if the teeth are tipped they will probably remain tipped. It is in this class of cases where bodily movement is indicated.

Another condition that we have to contend with in these cases is the result of the impacted third molar. We can all remember cases where the teeth were considered in perfect alignment, but when the individual returned at the age of eighteen or twenty years with teeth badly malaligned, we found upon examination an impacted third molar responsible for the difficulty. I think in all such cases we should be careful to keep our retaining appliance in position, until we are sure that the third molars are erupted and in their proper position.

It has been admitted by many orthodontists of standing, that they occasionally extract teeth in isolated cases where, in their judgment, without doing so they cannot bring about satisfactory facial outlines. Let us ever remember these cases are the exception, most always in older patients, and the teeth should not be sacrificed until we have brought about normal occlusion; or at least treated the patient a sufficient length of time to be positive that the best interest of the patient will be served by resorting to extraction.

Hugh J. Tanzey, Kansas City, Missouri: I do not think we can criticize the essayist for extracting in this particular case, for the patient was fourteen years of age. However, a case at that age can be made to look very well. As regard to the bodily movement of teeth there is not much to be said in favor of it. In my experience, some of the appliances that are recommended to move the teeth bodily are not all that is claimed for them, and you will find out later that if you had used the old expansion arch and ligatures they would have moved out just as nicely. I have models and records to prove this, and the cases I have tried out at length with the various complex appliances, I have often found were still not moving bodily forward at the conclusion of my treatment. At twelve or younger they will move easier, though I have had some older cases that I have moved out without these complex appliances and have obtained beautiful results without any extraction. In many of those cases we resort to extraction because splendid results can be obtained in much less time in that way.

Victor Hugo Jackson, New York City: It is my firm conviction that the general practitioner of dentistry and the orthodontist should be more provident in protecting their patients against unnecessary extraction of their teeth.

In this, we must remember that it is the future of the man and woman that we professional men are endeavoring to protect.

The extraction of a *young* person's *adult* teeth, for orthodontic purposes, is generally a very serious mistake. This is apparent when one carefully considers nature's plan of development of harmonious dental arches. A satisfactory result in regulating is not often brought about by the removal of teeth, but one now hears much about the necessity of extracting healthy adult teeth, including the third molars, all of which perhaps might help the operator a little in making a hasty correction of an irregularity.

Extraction has been recommended for this purpose at society meetings and, in some dental college clinics, one has heard students being taught that when the X-ray shows the crown of the third molar tipped in its socket (though it is still very deep in the process,) of the patient, seventeen to nineteen years of age, "the molar is impacted and should be removed." This often occurs even several **years before the molar should normally erupt. In the meantime, the body of the jaw would** become further developed, providing normal space for the molar.

I have often regretfully referred to this early extraction of teeth, under these circumstances, as I have thought this general extraction to be a crime. The professional man from his anatomy should understand that the dental arches and the nose are not often fully developed until considerably after the age of twenty and twenty-one.

Suppose there is a swelling of the tissues in the region of the third molar, as it is erupting? Usually it is controlled with simple treatment, but the general treatment for this condition at any stage of the inflammation is to secure access to the tooth and thoroughly treat the tissue walls about the crown of the tooth with iodin and iodoform powder once or twice a day. This will promptly control most any stage of inflammation of these parts, particularly if the medication reaches to the depth of the abscess around the crown by the use of a small bent probe.

In threatening advanced stages of inflammation, it may be necessary, in order to get access to the tooth, to remove some of the soft tissue or even of the covering alveolar process to permit a more free treatment by the iodin and iodoform with packing to control the inflammation and facilitate the eruption of the tooth.

When there is true impaction of the molars, the crowns can be often raised from their position by the use of metal fingers extending from an anchored regulating appliance.

Regarding the extraction of bicuspid or molar teeth, there is generally a corresponding arrest of anterior development of that part of the arch. At the same time, the nose continues its anterior development when, with this lack of normal anterior development of the arch and the continued anterior normal development of the nose to full maturity, the **nose is often caused by its prominence to** appear as a regular sign-post. This treatment should be avoided and the arches be equalized.

These cases should be studied with judgment and if there is any extracting, it should be as a last resort and usually late in the formation of the arch.

In my practice I extract but a very few adult teeth. When bicuspids are removed to accommodate the six anterior teeth, the forcing of the incisors backward most invariably would cause an excessive lap. This excessive over-bite often results in causing pyorrhea.

Regarding the retention of the teeth, I believe in long retention after regulating.

PREVENTIVE DENTISTRY

By ARTHUR D. BLACK, A.M., M.D., D.D.S., Sc.D., F.A.C.S., Chicago, Illinois

(Read before the Illinois State Dental Society, Springfield, Illinois, May 9-11, 1922)

IT IS the purpose of this paper to develop, if possible, a better working basis for the practice of prevention in dentistry. It should be the highest aim of the physician and dentist to prevent—even to eradicate entirely—the diseases which he is trained to treat. Carried to its idealistic limits, we might say that it should be our aim to so completely prevent disease that there would be none left for us to treat; practically, however, it is fully realized that we can hope, by the utmost endeavor, to do no more than reduce in small measure the incidence or severity of disease in general, yet there are numerous examples of specific diseases which have been practically eradicated.

Jenner's discovery of inoculation with the virus of cow-pox to prevent small-pox gave us the first positive means of eradicating a disease which had taken its toll of many, many thousands of lives. The experiments of Reed, Lazear, Carroll and Argamonte in 1881 proved the mosquito (stegomyia) to be the intermediate host in yellow fever, and both Reed and Lazear later gave up their lives in these experiments that the world might thereafter be freed of this scourge. It was the work of these men that made it possible for General Gorgas to prevent yellow fever in the Panama Canal Zone, otherwise General Goethals would certainly have failed, as did the French, in the construction of our great interoceanic waterway.

The development of our knowledge of typhoid fever and of the means of preventing this disease is most interesting. In 1837 Gerhard differentiated typhoid and typhus fever clinically, in 1880 Eberth isolated the typhoid bacillus, in 1896 Widal and Sicard introduced the agglutination test for typhoid, and in 1902 Firth and Horrocks showed that flies could carry typhoid bacilli. The principal fight against typhoid for many years was the effort to prevent contamination of water and food by proper sanitation; more recently the development of typhoid inoculation has given very nearly complete control of the disease. In our small army engaged in the Spanish war about 13,000 died of typhoid within a comparatively few months, while in our great army, averaging over three million, in the World War, there were but 163 deaths up to March, 1919.

Thus we see that while prevention of disease in general may not be expected, there is reason to hope that many diseases may be quite satisfactorily controlled. As the etiology and pathology of a given disease are better understood, progress should be made toward control or prevention. Success in prevention would seem therefore to be based primarily on progress in our knowledge of etiology and pathology.

The prevention of dental disease is largely a question of the prevention of dental caries, because decay is the forerunner of most of the other dental diseases. May we then review very briefly the development of our knowledge of etiology and pathology of dental caries as a basis for our study of methods of prevention.

Skipping over the very early writers, we find the beginning of our present day view expressed by Robertson in 1835, who stated that "caries of the teeth resulted from the action of an acid gen-

erated by the decomposition of food particles or fluids, which lodged at particular points about the teeth and dissolved out the calcium salts of which the teeth are composed. These points of lodgment were shown to be the points at which caries made its beginning."[1] Then came the chemical theory of caries, introduced by Regnard of Paris in 1838. Previous to 1860 John Tomes of London had worked out the practically complete histology of the teeth, which was very essential for the later development of our knowledge of caries. Magitot, of Paris, 1878, published reports of extensive experiments, his conclusion being that caries was produced by chemical substances developed within the mouth. Miles and Underwood of London in 1881, determined the presence of microorganisms within the tubules of carious dentin. Then came W. D. Miller, who demonstrated the microorganisms which produced caries by the formation of lactic acid when grown in the presence of sugar or starch.

In 1895 G. V. Black published a long series of experiments relative to the hardness and softness of various teeth. The tabulations showed that there was no essential difference in the percentages of calcium salts in the teeth of young or old persons, of those immune or susceptible to decay. These studies clearly indicated that difference in the structure of the teeth (except cases of hypoplasia) had no relation to the occurrence of caries.

J. Leon Williams published a series of articles in 1897, in which he demonstrated by photomicrographs the presence of gelatanoid plaques, which protected colonies of microorganisms on areas of beginning decays. In 1900 Dr. Joseph Michaels of Paris published a small book on Sailo-semeiology, in which he claimed to be able to determine conditions of susceptibility and immunity to caries by the study of the crystal forms from a drop of dried saliva.

Without going further into historical details, it may be observed that the whole trend of thought of our best scientists during the past fifty years has pointed to the *environment* of the tooth, rather than the *structure* of the tooth, as being the controlling factor. Much of clinical evidence, such as the more rapid decay of the teeth during pregnancy, after typhoid fever or other severe illness, with a return of immunity later, points to the saliva as holding the secret of our problem. It seems logical therefore, that in developing means of prevention, we should look to the environment of the teeth and to their external surfaces, where decay begins.

With this in mind, it has been claimed by the most enthusiastic proponents of the training of children in mouth hygiene technic "a clean tooth never decays," and thousands have been led to believe that they can prevent decay by brushing their teeth three times a day. There has apparently been no proper appreciation of the difference between a "constantly aseptic" clean tooth, which it is utterly impossible to maintain in the mouth, and a tooth which may be fairly well cleaned, in the ordinary sense of the word, three times a day. The environment of the tooth is doubtless improved every time it is brushed, but it seems to be quite out of the question to successfully prevent decay in the more susceptible mouths by the most frequent and thorough brushing that could be reasonably carried out.

The same might be said of the views expressed by D. D. Smith and his followers of a few years ago, relative to the prevention of decay by the oral prophylaxis treatment, so called. Here again is the "clean tooth never decays" idea, which is more unreasonable than if applied to brushing, because the brushing may be done three times a day, while the most enthusiastic oral prophylaxis men were satisfied if they could "treat" their cases once every few weeks. We should

[1]Black, Operative Dentistry, Vol. I, p. 62.

realize that decay will be retarded by the oral prophylaxis treatments, but we should not expect to prevent decay. Certainly, the combination of prophylaxis by the dentist and the best hygiene technic by the patient will accomplish more than either one alone.

At the present time our interest is centered on diet, and many believe that our secret is to be found in dietetic errors. Certainly some wonderful studies have been carried on with great scientific care. These studies are yet too new to permit of definite conclusions, but in view of much knowledge gained through the years, it seems likely that a solution of the cause of dental caries may be found in the changes in metabolic processes resulting from errors of diet.

In the study of diet in relation to decay, it appears to be important that our investigators pay more attention to the scientific work of our men of the past. The principal effort today seems to be to prove that the structure of the teeth is changed by changes of diet, therefore they decay. May we suggest that our line of investigation might lead to earlier and more satisfactory results if we consider the *environment* rather than the tooth itself. There seems to be every reason why errors of diet would be reflected in the saliva and thus permit or cause decay, whereas a correct diet which would maintain a normal saliva might prevent decay. This would seem to be the more logical route for our investigations.

Without wishing to in any way depreciate the value of the studies of diet in relation to dental caries, it might be well to call attention to the results which might be noted from artificially produced malnutrition in animals the teeth of which are continuously growing, as compared with the teeth of man. In man, we have a condition known as atrophy or hypoplasia of the first molars, incisors and cuspids resulting from a condition of malnutrition during the first five years of life. This is the period during which more or less of the crowns of the teeth mentioned are being formed, and the defective areas in both enamel and dentin correspond in point of their formation to the age of the child during the period of malnutrition. Malnutrition after the fifth year does not, as a rule, have any effect upon the formation of the teeth, consequently this condition is not found in the bicuspids or second or third molars.

The continuous growing teeth of the rat are in a constant state of formation, therefore, it should be expected that a period of malnutrition produced by changes of diet, would cause these teeth to be poorly formed during the entire period of malnutrition, and to be well formed again when the animals are restored to health by a proper diet.

If we might presume that studies of diet will eventually lead to a solution of the problem of preventing decay of the teeth, there must then be undertaken an almost endless campaign of education in order that the newly discovered truth may be practically applied. The utilization of this knowledge by our people would doubtless be even slower than the utilization by the members of the dental profession of the knowledge now at hand for the prevention of decay by operative means. If it were known today that certain modifications of diet would prevent decay, it is doubtful if any of those present would live to see the time when the most careful management of patients and the most painstaking technic will not be absolutely necessary for the preservation of the teeth, because of the difficulty of inducing people to follow directions in the matter of diet.

In our enthusiasm over mouth hygiene, oral prophylaxis and diet, many seem to have largely overlooked the preventive phases of operative dentistry. When the other measures—hygiene, prophylaxis and diet—applied as best they may be, fail in a given case, and we must admit that failure to a greater or less extent results in the mouths of a majority of children, then our principal reliance for the saving of the teeth is in the best oper-

ative procedures. These are generally known, but not well practiced.

First comes the operative care of the deciduous teeth, most neglected of all. The most prominent feature of our failure is lack of watchfulness, for the operations necessary to save the deciduous teeth are very simple. Possibly ninety per cent may be accomplished by the use of nothing other than black copper cement. The important thing is to see children often and be thorough in what we do.

Next come the first permanent molars. They are no more difficult to manage than the deciduous teeth. Frequent examinations and black copper cement will carry them safely through early childhood. Pit and fissure cavities in all of the permanent teeth may be similarly cared for until permanent operations may be made without overtaxing the child.

In placing permanent fillings, a perfectly definite set of rules have been laid down, including the principles of extension for prevention. To these must be added those rules of cavity preparation which conserve the pulp to the greatest degree, and the rules for so contouring fillings as to reproduce the best tooth forms with proper contacts and good margins. This is the best prevention against both recurrence of decay and diseases of the soft tissues.

The extent to which the treatment of irregularities enters into the problem of the prevention of caries is again largely one of the environment of the tooth. Irregularities produce bad environments in that they prevent the natural cleaning processes resulting from thorough mastication, and increase the difficulties of artificial cleaning. Oftentimes the soft tissues are subjected to frequent injury because of the irregularities. It is therefore important to the carrying out of all other means of prevention that there be the best possible arrangement of the teeth in the arches.

Of more importance than the treatment of irregularities is their prevention, which seems to have had little consideration by many members of the profession. The most effective means of preventing mal-occlusion is close watchfulness and care of the deciduous teeth. The preservation of these teeth by operative means, and the little things which may often be done to guide the permanent teeth into proper relationships, are of great importance. For example, the grinding of the cusps or sometimes the extraction of a deciduous tooth will so improve the relationship of the upper and lower first permanent molars as to prevent a bad case of mal-occlusion of an entire denture. This watchfulness of the deciduous teeth must be by the general practitioner, not by the orthodontist, unless we expect to refer all children to the orthodontist.

It should be apparant that the greatest success will be gained towards prevention by the best possible combination of all of the methods mentioned in each individual case. In the mouth of the immune child, none of these methods is of much importance; for the susceptible child, all are necessary.

Possibly the most important consideration for each of us to give to this question is to make of it the closest personal application to ourselves and to each patient—particularly to each child. With the means at hand, should we not be able to take a child at three years of age and, with proper watchfulness and co-operation upon the part of the child, carry it through to adult life without the loss of a tooth or the death of a pulp? Not in every case. But if we see the child often enough and do our full duty in training the child in mouth hygiene and in caring for the teeth, a high percentage should be carried through successfully. It is largely a question of realizing our opportunity with each child that presents, and of applying the rules of patient management suitable to the case. Can we not take this question of preventive dentistry out

of the field of generalities and consider it a personal obligation between ourselves and each child patient? This is our problem as applied to the standing of dentistry in the next generation. There will be no better measure of the real success of each of us than the percentage of children whom we can pilot through to adult life with a full complement of teeth with vital pulps.

Discussion

C. C. Corbett, Edwardsville, Illinois: Dr. Black has divided his paper under five headings, and has given us a most excellent paper. He expects the greatest amount of preventive dentistry to come as a result of the efforts of the dentist and his patient. This confines the amount of preventive dentistry to a very small per cent. A broader field could be taken, and the general public, and the high schools could be reached with a series of well prepared lectures, charts, and radiographs, showing abscesses, blind abscesses, dead roots, and all stages of pyorrhea. With a corps of good speakers in the field, what a vast amount of preventive dentistry could be accomplished!

Under the first heading, that of mouth hygiene, it is my belief that very few practitioners give their patients detailed instructions on the care of the mouth. I have, of late, quite frequently, when ready to dismiss my patient, taken my toothbrush and demonstrated in my own mouth just how to brush the teeth, then the gums and the tongue.

The second head, that of oral prophylaxis, is of most vital importance, and difficult to handle, especially where serumal calculus exists, and when a dentist is able to efficiently care for his patients along prophylactic lines he has reached the crux in preventing pyorrhea.

The third heading, that of diet, I will simply say "amen" to what Dr. Black has said.

The fourth heading is preventive phases of operative dentistry. It seems to me that the greatest good under this head would result by the dentist constantly reminding his patients of the importance of frequent examinations and never allowing the decay of a tooth to reach the pulp, and impressing the fact that when, by neglect, it becomes necessary to devitalize, failure often results on account of the tortuous canals, which cannot be perfectly filled, resulting in abscesses and the ills that follow, or the loss of the tooth, which in turn makes it necessary for a bridge of some kind. If the above picture can be kept vividly in the minds of our patients, and all cavities filled when small, or in incipiency, that would reduce the amount of crown and bridge work to the minimum.

To substantiate the above, I will state a case in practice. Miss M., a farmer's daughter, in her early teens, came to my office twenty-three years ago to have a tooth filled, manifesting considerable interest in her teeth, and stating that she could not spend much money as her father did not believe in dentistry. I explained to her how she should care for her teeth, and told her that if she would have all cavities filled when very small, she would preserve her teeth for less than one-half of the expense than if allowed to go until the cavities became large.

During these twenty-three years, I have inserted fifty-two fillings, without the loss of a filling, and devitalizing but one tooth, and at a minimum expense. I should term this prevention of crown and bridge-work.

I have one high school boy, sixteen years old, bright, well developed, in perfect health, with forty-four fillings; one girl, a clerk, in good health, eighteen years old, having over fifty fillings, and to all appearances it is going to be exceedingly difficult to keep up with the ravages of decay. Such cases as this, gentlemen, take all the starch and pep out of a dentist and leave him perfectly limp.

When one realizes all the diseases the teeth are responsible for, all the ills resulting from blind abscesses and focal infections, then he realizes that he must not allow the decay in any of his patients' teeth to reach the pulp.

When one has cases like those above mentioned, he begins to look for some more specific course of treatment than has been outlined so far by the dental profession,—something specific, whereby the surfaces of these teeth can be brought to a more normal condition.

I believe this can be done, and I think the work should be taken up by our scientists, bacteriologists and chemists, or our research department, until some compound may result, which would destroy every germ, eradicate plaques, and prevent their formation, when applied to the polished and dried surfaces of these teeth, at stated intervals.

I am in perfect accord with Dr. Black as to the importance of environment, and I think it is very important that the general practitioner should be capable of taking a child at the age of nine years and placing the six year molars in normal occlusion, and then directing all the other teeth into proper alignment as they erupt. If this can be done, great advantage is gained, and proper environment obtained.

The demands of preventive dentistry are on the boards of the dental profession, and I hope the profession will be able to meet those demands.

F. Blaine Rhobotham, Chicago, Illinois: There is one outstanding thought to be gained in reviewing Dr. Black's excellent presentation, and that is, to apply all of our knowledge in attempting to practice preventive dentistry. He has well said, "the greatest success will be gained toward prevention by the best possible combination of all of the methods mentioned in each individual case." The majority of individuals engaged in the practice of dentistry today find themselves completely absorbed with the problems of reparative dentistry, and naturally so, because the average successful practitioner finds a sufficient field for study and for application in the reparative and the curative side of his practice. The dental school from which the practitioner graduated did not stress prevention in the larger sense. Prevention has not had the place it should have in the dental school curriculum. Many papers of great interest and truth may be presented at our dental meetings, but I doubt if we may hope to materially change the attitude of the majority of men already in practice because that has not been a big part of their school training and has been shunted in their practice because of the many demands upon their time for other things. It is hard to make men over.

My convictions are that if we are to meet the problem of prevention in dentistry it should occupy a prominent part in the dental school curriculum, requiring that each student shall have a theoretical and clinical training in preventive dentistry. This applies largely to children. We will then be able to send out men into every community who not only can practice preventive measures but will be inspired by their training to do so. The dental university is the natural and logical place for research along this line. The greatest opportunity to bring about a new era in dentistry is knocking at the doors of our dental schools.

Grafton Munroe, Springfield, Illinois: I wish to take this occasion to speak of the wonderful ideas and suggestions mentioned in Dr. Black's paper with relation to the care of children's teeth. There is no subject that should appeal more to the dentist than this, for we have been told that if we "train up a child in the way he should go, when he is old he will not depart from it." If the children have teeth that are surrounded by the right environment and they start out early in life with proper care of the teeth, it stands to reason that the habits they form in childhood should carry them through life; but many children with beautiful temporary teeth have been presenting themselves in the offices of dentists who do not take particular pains to instruct them how to take care of them. When a dentist sees these beautiful teeth with well formed arches, rarely exhibiting any malocclusion, he wonders why it is that these perfect arches cannot be carried through into later life. Proper care of the children's teeth early in life has always been a peculiar impulse with me, and in my years of practice I have found great delight in taking care of the teeth of children.

Dr. Black spoke of the influence of the saliva. Cyanid of potassium has been found to be an element of the saliva, and it is really a preventive of dental caries, if it is in the proper proportion, and when by chemical analysis there is found to be a deficiency in the saliva, it has appealed to me that a proper test of the saliva will lead us to put these patients under a physician's care so as to make up the deficiency in the quantity of cyanid of potassium. I do not know how to get at that because I am not a medical man.

The use of copper cement is a valuable suggestion from Dr. Black, and I think any one who is fond of children should never neglect to use that in the treatment of these teeth.

In Springfield we have had considerable luck with the care of the school children. For some years we have had a clinic established, and notwithstanding what our president said about Peoria, I think we were ahead of Peoria for several years. The dentists of Springfield very kindly gave their services freely for dental clinic work connected with our public schools. I was on the school board of Springfield at one time, and I was very happy in bringing about a paid dental clinic in Springfield, and now we are operating a dental clinic, the school board paying the bill, which is doing valuable work and rendering great service to our school children from the little tots up to the higher grades. There was some prejudice at first against that, but it has done a vast amount of good in our community. That is one of the means of caring for the teeth of children and starting them along the right road.

George D. Sitherwood, Bloomington, Illinois: I want to call the attention of the younger members of the profession to some things that Dr. Munroe mentioned about the treatment of the teeth of children. At the present time, I find there are many dentists who do not appreciate the value of their services to the children that come to their offices. We know how often they come to our offices with fear and trembling and do not wish to return. I plan to have children's books that are attractive and have them bring along some companions, and while I am working for them the companions may look at the books. Instruct the young lady attendant in the office to be pleasant to the children and try to attract them. The young lady is attractive to them even if the dentist is not. We can make our offices very attractive to children, and we

should do that, because when we try to teach elderly patients properly to take care of the teeth and to brush them, they will do it once or twice and then forget about it. Children are more likely to follow our instructions in regard to brushing and cleaning the teeth than the grown-ups.

N. A. Styrt, Melrose Park, Illinois: This is a subject in which every dentist should be interested. I think it is the duty of every practitioner to devote some time at certain intervals to teaching the necessity of preventive dentistry, so as to obtain beneficial results in both the children and the parents. A dentist should deliver lectures in his community monthly, one chosen for the parents, and one for the children. He could talk to them on the subject of oral hygiene and on other subjects of interest to them. It is noticeable that in the communities where some practitioners have taken the pains to bring these subjects to the attention of the people, they find their efforts to be very much appreciated.

If there are children in the community who are suffering great distress on account of decayed teeth or disease of the mouth and jaws, we have at our command today both local and general anesthetics with which we can easily do away with the horrors of olden times. We need no more to extract a tooth of either child or adult leaving an everlasting impression of agonizing pain in the minds of the patients.

In conclusion let me urge, a greater interest in the children and in the people of the community, the fruits of your labor you will never fail to reap.

Dr. Black, (closing): My object in preparing this paper was to confine it very closely to the work of the dentist in his office, and I desired to impress the importance of the full use of all these different measures of prevention, and not the use of any one or two to the exclusion of the others. We have been too much inclined to take up vigorously every new plan that is presented and to discard methods previously practiced with good results. I have been fearful in recent years of the change of attitude of too many men in the profession away from the careful, painstaking procedures of a preventive nature in operative dentistry, which are today the most important of all.

Dr. Corbett referred to the work in our schools and to those phases of what we may call community dental service which I realize are of great importance and have a relationship to the problem which I have presented, although I purposely did not touch upon them.

I fully appreciate the wonderful work that has been done by such institutions as the Forsyth in Boston, the Eastman in Rochester, N. Y., in the Bridgeport, Connecticut, public schools, and elsewhere. The incidence of dental caries in the mouths of children in the sixth grades at Bridgeport was reduced about 50 per cent for those children who had the best of care over a period of five years from their admission to the first grade, as compared with those in the sixth grade who had not had the training in mouth hygiene, and who had not had the same care in the way of reparative dental service. There is no question as to the tremendous value of the training of children and the education of the public in mouth hygiene technic.

Again, there is no question as to the importance of frequent cleaning of the teeth by a dentist, which has the additional value of affording the opportunity of keeping a check upon the mouth hygiene technic of the patient, thus maintaining the patient's active interest in his own behalf.

Dr. Rhobotham spoke especially of the lack of training of students in our schools along the line of preventive dentistry. That is a fact which is recognized clearly by every one connected with our dental colleges. The teaching of preventive dentistry in a dental school is one of the most difficult problems we have ever undertaken. Preventive dentistry is centered in the very young children, and it requires a partial reorganization of our dental schools in order to get the idea of preventive dentistry properly fixed in the minds of our students. It requires the development of special means of studying children apart from adults. The men connected with our colleges are studying this problem, and they are making progress with it.

Finally, I wish to again say that the establishment of the best teaching of prevention in our dental schools will not help those who are already in practice This brings us back to the personal responsibility of each dentist to each child patient. If we can get it fixed in our minds that our first possibility is in applying the means we have at hand to each child, the very serious question of the management of children will be largely solved. If each dentist will make up his mind that each child that comes to him will receive the best service he can give it, regardless of the financial return, he will make a real success of his life work and be a better satisfied and a happier man in his later days.

DENTAL HEALTH WORK IN MASSACHUSETTS

By EVELYN C. SCHMIDT, Health Instructor in Mouth Hygiene, Massachusetts Department of Public Health, State House, Boston

(Read before the American Dental Association, Los Angeles, California, July 17-21, 1922)

HERBERT SPENCER once said in a prophetic moment, "To be a nation of 'good animals' is the first condition to national prosperity." Likewise, the prosperity of a state is measured by the health of its citizens.

It was, therefore, for the purpose of making health an asset in Massachusetts that a State Board of Health was founded 53 years ago, the first in this country. Its aims are the eradication of preventable disease and the maintenance of citizens in the best physical and mental condition.

Dental health work logically comes under both of these headings as dental caries is a preventable disease, the existence of which is detrimental to the health of the individual.

For years dentistry was an isolated, segregated profession. Gradually, however, the close relationship between the health of the oral cavity and the general health of the individual has been recognized by the dental and medical professions. But it is only recently that mouth hygiene, en masse, has begun to receive official attention as an integral part of public health protection and to be co-ordinated with other forms of health work.

As public health work is branching out and its roots are becoming more firmly embedded in the solid foundation of prevention, specialists, obstetricians, pediatricians, nutritionists, industrial physicians, dentists, and educators are developing less exaggerated notions of the importance of their particular field and are joining hands to help people along the highway to good health. The obstetrician is discussing the possible relationship of focal infection of the teeth to the toxemias of pregnancy. The dentist and nutritionist are studying the effects of diet on the teeth. The educator is recognizing the part which mouth hygiene plays in the school room and so on ad finitum.

The staggering problem of dental decay with which the dentist has been confronted for generations is now a public health problem in which all health workers are interested.

Let us review the situation as it is seen from the state house.

Geographically the state presents all types of communities. The little town of Mt. Washington carefully snuggling its 73 inhabitants at the foot of the hills which make it a hard day's trip to the dentist; Boston harboring 750,000 heterogeneous souls, with 1,000 dentists at their beck and call. Still in both places old people are chewing without teeth, school children crying because of their

teeth, and the family toothbrush still hangs by the sink!

What must be done?

Of course dentists must continue filling the teeth of those who seek their services, but for the multitude who do not, because they cannot, because they will not, or because they do not understand, something must be done.

Is it a state problem? Should the state provide the treatment and educate the people?

The answer in our state is based on a policy that the citizens decided upon and have upheld for years—that of local responsibility and control. Because this is the sentiment of the people, the State Department of Health serves the people merely in an advisory and educational capacity, while the community assumes the responsibility of providing treatment, when it is necessary, either under official or unofficial auspices. In fact, in 1920 a statute was passed empowering cities and towns to establish dental, medical, and health centers and to conduct educational campaigns in connection therewith under the auspices of the board of health.

As communities begin to realize the magnitude of the mouth hygiene problem in their midst, the initial step which they take to counteract this is that which is most spectacular and comprehensible,—the reparative dental clinic.

The first dental clinic in Massachusetts for people with limited incomes was established in 1867 coincident with the Harvard Dental School. In 1874 the first dispensary dental clinic was opened. Dental service in the beginning was primarily for adults, but in 1908 a step toward preventive dentistry was taken, for it was then that the first school dental clinic was founded, a clinic primarily for children.

During the fourteen ensuing years dental service for school children has increased to the extent that now 138 of the 355 cities and towns or about 38 per cent of the communities in the state have some form of service.

Ninty-three of these communities have their own equipment, meagre in many instances but always a source of civic pride; and, after all, is it not the mental attitude which prevails within a clinic rather than the equipment which makes for success. Of course everyone recognized that an ideally equipped clinic is a psychological asset but it is sometimes an unwarranted extravagance. Sixty-one per cent of these clinics are under official auspices, 39 per cent under unofficial. Some of the clinics operate one day a week, some every school day, the dental clinicians receiving salaries varying from 80 cents to $4.00 an hour, the average being $1.65. Perhaps it is fitting to mention here that it is hoped that a scale of salaries based on preparation and experience may be worked out by such a body as the American Dental Association. Suggestions as to personal qualification might be apropos, for because a dentist is a dentist he is not necessarily fitted for school work. The dental schools might help to improve this condition by giving special training for this type of service. It is men with patience, vision and understanding that we need.

As I said the state has no mandatory power over the establishment and maintenance of clinics. We act as a clearing house where citizens may come to find what other communities are doing, to get suggestions about equipping and operating a clinic. We also try to interest and stimulate communities to realize the importance of dental health work. Believing that a "dental awakening" as I like to call it, is essential in every town, we have outlined a program and prepared material for this,—an exhibit, literature, slides, motion pictures, and lectures.

There are several important, fundamental points which we urge a community about to establish dental service to heed,—to seek the co-operation of all official and unofficial agencies and of all local dentists, to think of a school dental clinic not as a thing per se but as part of the health equipment of a school, its aims and policies to be understood by those who touch the health of the school child. They are advised to operate the clinic on the basic idea of prevention and hence to confine the work to a definite field in the lower grades, making general prophylaxis and hygienic instruction the primary and curative work the secondary consideration; to determine, in fairness to the local dentist, that the patient is worthy of service, if it is a philanthropic clinic; to see that the clinic is open to all school children if it is supported by municipal funds. These are a few of the suggestions which we make.

But to return to clinical service; besides the ninty-three communities having permanent clinics, fourteen either appropriate funds for work for needy children to be done by a local dentist or are reached through a health center.

Thirty-one additional rural towns have the services of a traveling clinic, four of which are operating in the state under unofficial auspices,—the County Farm Bureau in three instances and The American Red Cross in the fourth. These clinics are in no way charity clinics. Instead, they answer the question of inaccessibility to dentists for the policy is to operate preferably in towns where there is no local dentist. They are consequently self-supporting, charging from $2.50 to $3.00 an hour. They work entirely for children although emergency work is done for anyone.

Massachusetts now has twelve communities in which dental hygienists are employed for school work. In one instance a private individual supports the work, in the other nine cases, the local board of health. The dental hygienist is gradually finding her place in the broad field of public health work.

Admirable as the increase in school dental service may be, are we reaching the core of preventive dentistry? Our children may leave school with healthier mouths but are our children coming into school with fewer cavities to be filled by the school dentists? Unfortunately, no. To overcome this we must increase the dental facilities for the preschool child and redouble our attention on the mother during the prenatal period.

But the key word to "prevention" is "education". Even now civilized man is fettered by mythical adages which have been handed down from generation to generation. Superstition, prejudice, ignorance must be counteracted—counteracted by education.

Mother must understand that Johnnie does not inherit "soft" teeth from his father but that the predisposing causes of dental infection may be traced to improper diet during pregnancy and infancy. Mothers must know that children do not need to have the so-called children's diseases and that the development of the teeth is seriously interfered with by all diseases affecting the epithelial structure. Parents should learn that the "little taste" of sweet, given with the best intentions, leads to the cultivation of the mythical "sweet tooth" which is injurious to all of the teeth. People must be aroused to the realization of the importance of the first teeth, of the sixth year molars—of all the cardinal points in dental health.

Dentists alone can never reach all the people with the truth about preventive dentistry. They can, however, teach others who in turn come in contact with the laity from different angles. Because

of my aspiration for the ideal and my confidence in the future of preventive dentistry I venture to suggest that there should be more emphasis laid on the subject in normal schools for teachers, in training schools for nurses, in training courses for public health nurses, in medical schools and, I am forced to add, in the dental schools also.

Our educational work, as I previously said, is carried on through motion pictures, lectures, slides, charts, mottoes, posters, exhibits, and literature, all of which may be obtained gratuitously by any citizen of the state. In all of our teaching we try to emphasize the positive rather than the negative. "Decayed teeth" is not an euphonious phrase. Therefore, we try to construct healthy mouths with diet (delicious fruits, tasty vegetables, palatable eggs, natural grains) with mastication, refreshing brushing, and frequent visits to the dentist, all factors over which every individual has control. And these mouth hygiene hints appear in our prenatal and postnatal letters, in our literature on infant and child care, on diet, and of course, in all literature on mouth hygiene.

Through joint conferences of the Department of Education and the Department of Public Health which have brought together workers in both fields, teachers, school nurses, school physicians, nutritionists and hygienists, methods for emphasizing the importance of mouth hygiene have been discussed. This year we hope to reach these groups again as well as to give lectures on oral hygiene in the normal schools thus acting as a link between the dentist and the school teacher.

And all the time we are looking for guidance. No matter how many people may be teaching in a simple manner the truth about a clean mouth, in the class room, in clinics, before club women, in industrial plants, everywhere, all are looking to the dentist to tell definitely why teeth decay, how important vitamines are, and if candy really is bad for the teeth.

You know the questions. Dentists must answer them if they are to do their share toward building up a prosperous, healthy nation.

Wise men have taught us to cure evil at its source. Prevention with children is better than cure with adults and so it is for the child that I appeal. Every child has a right to be as healthy as present-day knowledge can make him, but every child does not have a chance. Help him to have it. Help to build up the health of our children. It is a national problem, a state problem, your problem and mine.

NUTRITIONAL RELATIONS

By A. W. HOMBERGER, A.B., M.S., Ph.D., Louisville, Kentucky

NUTRITIONAL relations offer a big field for preventive dentistry. The physician has come to realize that from eighty to ninety per cent of all diseases, exempting acute infections and contagious diseases, are without doubt directly or indirectly due to the diet. Knowing this, the field of dietotherapy has received within recent years a considerable stimulus and has brought out some vital findings for the dental profession.

A bulletin of the United States Children's Bureau estimated a few years ago in a survey that from three to six millions of American children are malnourished or underfed. Some of these children literally do not get enough to eat, more perhaps do not get the right kind of food and some are not able to properly assimilate the food through physical defects. Dr. Baker, in a report a few years ago, ascertained that one-fifth of the school children in the city of New York were underfed. Dr. Thomas Wood placed the estimate for the entire United States between fifteen and twenty-five per cent. This underfeeding does not manifest itself necessarily by ailments in early life, but first crops out in what parents and teachers may speak of as the delicate, lazy or "ornery" child. Frequently the underfed, though not sick, have an unhappy, tired and worried expression and show it through weak, mealy milk teeth, or slow formation of permanent teeth, and, as I shall point out a little later, the wrong diet often manifests itself in decalcification. I can show by experiments in the laboratory on young white rats that ninety-eight per cent of retardation in any form is due to nutritional disturbances of some kind.

How about adult life? Do we realize that eighty-five per cent of all the ailments of middle life and later life are due to nutritional disturbances—disturbances that have arrived through the fact that we have not properly guided our diet and have allowed ourselves to become depleted in some one constituent or become unbalanced in some way, or maybe choked the system with refuse. The body is like a motor car. It needs the proper fuel and it needs the right amount. Greatest efficiency can be obtained only by using proper foods in the right proportions, together with the proper body care. We should know the underlying principles of nutrition that effect dentition as thoroughly as we know our practical work, in order that we may be able to properly advise our patients as to the effect of diet for healthy tooth structure.

To keep the body in proper shape for normal growth, development, and maintenance, man needs a variety of types of food, in the diet. He needs (a) body fuels, (b) body builders, (c) body regulators. To secure these, six distinct types of foods are necessary.

1. Carbohydrates: Foods derived from vegetable sources, such as potatoes, bread, rice, vegetables, sugar, etc. (Fuel.)
2. Fats: Foods derived from animal and vegetable sources, such as milk, nuts, butter, vegetable fats, bacon, meat fats, etc. (Fuel.)
3. Proteins: Meat and milk, eggs, fish, cheese, peas, beans. (Builders.)
4. Roughage: Green vegetables. (Regulators.)
5. Mineral Matter: From milk, eggs, fruits, vegetables, cereals. (Regulators.)
6. Vitamins: Milk, eggs, fruits, vegetables, cereals. (Regulators.)

The carbohydrates and fats serve as fuel and cannot build up tissue; they burn to carbon dioxide and water in the

body and are largely sent out of the body through the lungs. Carbohydrates are the foods that maintain body heat and energy. They constitute the bulk of your diet. They are absolutely essential to your health. A lack of carbohydrates soon causes acidosis. It is, however, undoubtedly true that the large quantity of cereal type of carbohydrates in our present-day diet has created the nutritional problems of today. Through the fact that we make use of the highly refined cereal products almost entirely, we have brought about nutritional disturbances. If we had used and were using unpolished rice, whole wheat flour, etc., instead of the refined cereals the nutritional problems would not have reached the present status.

Formerly, it was thought that some fat was essential in the diet. However, in recent years it has been shown that perfect health can be sustained for a long time without fat in the diet. The reason for this is that the body can manufacture its own fat from starch and sugars. Though not absolutely essential they are wholesome and useful constituents of the dietary. If too much fat is consumed it produces an increase in body weight, hastens intestinal putrefaction, and is apt to give rise to the condition known as acidosis. Fats should never be used alone, but in combination with carbohydrates. It has been shown repeatedly that fats require carbohydrates for their utilization. Therefore, they should be used with breadstuffs, starchy foods, and cereals. When I refer to the possibility of getting along without fats, I make one exception—cream or butter fat. From all the nutritional experiments, I maintain that butter fat is the one essential fat without which continued maintenance is an impossibility.

The third type of food referred to, namely proteins, is one of more importance than either of the other two. Protein foods, derived in American life chiefly from meats are the one type of which most, if not all of us eat too much, Protein foods, different from other types, when broken down in the body, cannot be eliminated through the lungs. They are of a character which means for the most part elimination through the kidneys. From infancy to maturity this type is required for growth and repair; after maturity only for the repair of tissues. The question then is, how much protein should we consume? Authorities vary from sixty grams to one hundred thirty grams per day. Any excess beyond what the body requires for repair of tissue will materially raise the nitrogenous output of the body, and through it put excess work on the liver and the kidneys. Experiments on a large number of my own students the last few years show that the urea on a high protein diet may raise the output by one hundred forty-two per cent, and the uric acid by sixteen per cent. From this it is very evident that on a high protein diet the kidneys' work is increased tremendously and when kept up will mean a lack of functioning, sooner or later, of the organs concerned, namely the liver and kidneys. When the functions of these organs are impaired and these toxic waste products are not removed, then disease will follow. However, not alone must we consider the products that are actually produced by the wear and tear of tissue, but in excess protein, or meat eating, we must also consider the undigested portions which remain in the intestines, and which by no means leave the body in that form without doing their harm. Proteins in the intestines are worked on by bacteria and undergo putrefaction. In this process of putrifying, toxic compounds are formed. These are absorbed into the blood and circulated through the liver and if not too heavy will be detoxified. But when this organ does not function properly, or whenever there are too many of these highly toxic substances thrown into the system, they produce as their first symptoms sluggishness, headaches, weakness, etc., and later disease.

Dr. Hinhede, director of the Nutri-

tional Research Laboratory established by the Danish government, has discovered some interesting facts as to the effects of proteins on the urine, and strongly advises against a heavy meat diet. Dr. Owen Williams in a report to the British Medical Association states that appendicitis cases are very frequent in England in those sections where there is a great meat consumption. In Roumania reports show that in the rural districts where there is little meat consumed there is one case of appendicitis in every twenty-two thousand sick patients, while in the urban districts where there is much meat eaten, one in every two hundred twenty-one patients. The Arabs are low meat eaters and reports from physicians disclose that nutritional diseases are unknown, and ulcers and cancers of the stomach seldom found. The explanation that seems to be feasible is that possibly appendicitis is caused by a type of fermentation after excessive meat eating.

Too much meat through the factors mentioned has a tendency to produce hardening of the arteries, and you know that hardening of the arteries means high blood pressure. Is it not possible that some of the pyorrheal conditions may eventually be shown to be traceable to excessive protein material? I do not want to convey the idea that an exclusive vegetable diet is desirable, but I do want to emphasize the fact that the tendency is for most of us to eat too much meat.

Remember that our protein supply comes to us from other sources than meat, so that we do not depend entirely on it for our supply. Eggs and milk furnish good types of proteins. In fact, such an authority as McCollum says that milk is of more value than meat in a nation's diet. McCollum also says that no family has the right to purchase any meat until each member of the family has at least one pint of milk. It is true that we could get along without meat entirely if we had ample milk and products in our diet. Caspari has shown through experiments that the protein present in milk is far better than the protein derived from meat. The toxic substances that form from meats to which I have referred do not form from milk proteins, due to the fact that the milk sugar in milk has antiputrifactive properties, and those organisms that do act form harmless acids. It is also true that the proteins of milk and blood are identical from a physiological standpoint, and through this identity are able to be used completely when hydrolyzed in the process of digestion. I have always maintained that for the highest efficiency of a people it is wise to cut down the meat bill and increase the milk and milk products' bill. I am at present conducting some research work to see what the effect of the toxic substances derived from meat and largely absorbed in the large intestine will be, if any, on the teeth, a phase which so far does not seem to have been determined.

To have good digestion of the three discussed products, namely carbohydrates, fats and proteins, it is quite essential to have ballast or roughage. This can be supplied through the green vegetables and fruits or bran. The indigestibility of these makes them valuable by adding bulk to the intestinal mass, which in turn stimulates peristaltic activity, and hence prevents constipation. The amount of actual nutrition derived from lettuce, celery, etc., many containing around ninety per cent of water, is almost negligible, yet the indirect value is inestimable. Dr. Hart of Wisconsin has shown that if roughage is eliminated from the diet of chickens they soon get leg weakness. This can be corrected by the feeding of paper as roughage. Again, we know that rabbits die when they receive no roughage, due to the fact that the movements of the bowels stop. Pitz of the University of Wisconsin, has shown that a retention of an undue amount of fecal matter accompanied by putrefaction in the intestines may cause scurvy—a disease in which there are some vital dental relations. Furthermore, these bulky foods are conducive to more thorough

mastication, therefore good for the teeth. The fruits and vegetables carrying cellulose carry also organic acids which are good for cleansing the teeth, therefore of double significance from a dental standpoint. Bound together with the foods we have described as supplying building materials, namely proteins, there is another group that is an integral part of the human system—the so-called mineral matter or inorganic material. Though the percentage of this material in our diet is comparatively small as compared with the three other types described, it is an essential requirement, and if denied the body through food will rob the system of its normal functions, and will lower its vitality. This mineral matter is needed to build up and maintain skeletal tissues—bone and teeth, as well as form part of the composition of muscles, blood cells, etc. The main inorganic constituents are calcium, sodium, potassium, magnesium, iron, phosphorus, sulphur, iodin and chlorine. These constitute about four per cent of the weight of the body and are present entirely in the inorganic state. The body loses in metabolism from two-thirds to one ounce of inorganic salts per day, including all the elements referred to. This loss through the excretions must be compensated in some way through the diet, and if not an equal amount is returned daily, the system will draw on itself and deteriorate the skeletal structures, namely, bone and teeth. Of the elements which are probably of most interest none is so outstanding as calcium. In combination with phosphoric acid it constitutes bone, in soluble form it is important in the coagulation of blood, as well as the contraction of muscle. The former significance is well brought out during the growing periods of life. Abstract from the diet at that time the calcium salts and you find lack of proper development of bone and teeth. To be sure, adult life needs calcium too, yet its lack or deficiency is not so marked, in that the body can feed on itself. Also, during the period of pregnancy and lactation there should be an increase in the diet of calcium. The skeleton of the infant before birth and for a time after birth is solely dependent upon the mother. Therefore, the mother's calcium diet should be increased. Bunge has ascribed the weakening of bones and teeth in the mother during that period, including the period of lactation, to the deficiency of calcium in the diet with the result that the nutritional requirements of calcium for mother and child are withdrawn from the structures in the mother that holds them, namely bone and teeth, and the frequent decay of the teeth of the mother during pregnancy is undoubtedly due to the fact that there is a drain upon the calcium reserve. Sherman, in an article in the *Journal of the American Medical Association,* in 1919, pointed out that the "ordinary mixed diet of Americans and Europeans at least among dwellers in cities and towns is probably more deficient in calcium than in any other chemical element." This deficiency can be made up by proper choice of foods or by adding soluble calcium salts, or even calcium carbonate to our common salt in our diet. This fact is well brought out in the feeding experiments in the white rat. Frequently, in a diet deficient in calcium, I find that the mother will eat her own young even after they reach the age of three or four weeks. All other dietary constituents are given amply. Undoubtedly it is a calcium hunger, a craving for calcium and the fact that mineral starvation is going on that causes the mother to become carniverous.

It is also fundamentally important that the child's diet be watched carefully after it is no longer dependent on the mother. Up to that time milk, rich in calcium, constitutes the main food. Thereafter, when the mixed diet begins, a calcium deficiency is apt to occur, manifesting itself in soft bones and decalcified teeth. Abundance of calcium and phosphorus makes possible rapid, rigid and strong skeletal structures.

Herter has done some work along these

lines, in which he estimates that the food of a child must have one-tenth gram of calcium in excess of what the child's body actually needs. According to Herter, young life must have about thirty-seven grams of calcium annually from the third to the sixteenth year.

Evvard, Dox, and Guernsey, back in 1914, showed that adding daily two and one-half grams of calcium to a corn-grain diet, which is deficient in calcium, has a very marked and favorable effect on the offspring of corn-fed pregnant sows. In the same year, Hart and McCollum likewise found that in swine fed on a restricted diet of cornmeal and corn-gluten feed there was little growth. They added to that diet a salt mixture approximating that of milk and found that good growth was the result.

One is naturally asked how do we know that enough calcium is being taken, or how can we increase that element or make sure that enough is taken? If the food consists chiefly of meat and cereals we are very apt not to get enough calcium salts. If the diet, however, is made up largely of milk, eggs, legumes, and fruits, we need not worry. The best calcium food comes through good fresh milk. The calcium and phosphorus in it are more easily metabolized than in the vegetables, and are present in a ration essential for the offspring of each species. In case children have not available good fresh milk their diet should be supplemented with soluble calcium salts in some form or other. During the period of growth do not depend entirely on vegetables, if milk is absent in the diet. Foods rich in calcium are cheese, beans, egg yolk, milk in all its forms, oatmeal, wheat bread, irish and sweet potatoes, cauliflower, olives, celery, spinach, etc. From this you can see that we need not take medicine to supply the calcium salts; all that is needed is a proper balance of diet. McCollum and his collaborators have also demonstrated that a disturbance in the ratio between the calcium and phosphorus causes the deficiency disease known as rickets, the disease that became such a problem amongst the children of England and some other countries during the recent war. The disease manifests itself in faulty bone formation. By some it is claimed that fifty per cent of the children in the United States suffer with the disease at some time.

Under certain metabolic disturbances, as in scurvy, the loss of calcium is very much in excess of what is taken into the system, and as a result decalcification takes place. Also, under these conditions the teeth often become loose which might be due to calcium-loss directly, or from the alveolar process.

Within the last decade a new nutritional problem has come to the front—one that concerns the medical and dental world undoubtedly more than any one factor I have described so far, and one that for lack of a better term can be labeled the vitamin problem.

This vitamin question, although appearing as a rather new nutritional problem, has concerned physicians for many ages. Way back in the thirteenth century, when the Crusaders invaded Egypt, deJoinville records a disease in which he describes the condition of the gums as being livid and spongy, and tells how "the barber surgeons were forced to cut away the dead flesh from the gums to enable the people to masticate their food."

Horerschelman reports cases where scurvy was feigned "by rubbing the gums and making them bleed or by irritating them with the juice of tobacco." Again, we have records in 1703 in Prussia where during the siege of Thorn there was an epidemic of scurvy killing five thousand. The Russians report it in their early wars, as well as the French and English. As far back as 1720 we have our first record of Kramer writing that neither medicine nor the knife could cure scurvy, but that green vegetables could. Scurvy, which had been common in the early history of the British navy, was remedied in 1804 by an order that lemon juice be made a compulsory part of the diet. Before this

thousands of cases were found amongst the British sailors. Likewise, for years in the Japanese navy a disease known as beri-beri was common, often running as high as forty per cent of the whole navy. The Japanese boys were living chiefly on polished rice. In 1885, Takake attributed their troubles to the diet and substituted whole cereals and the Japanese navy was free from beri-beri.

In our own Civil War the soldiers suffered from this disease and records show that this was also the case in the Franco-Prussian War. In fact, no country has been devoid of this malady. On long sea journeys where fresh vegetables and meat were lacking, scurvy always caused suffering. Even in our recent world war, with all of our newer knowledge, we find that scurvy had its sway in Russia. Hess tells where the scurvy was common in the French army, as well as in the Italian army. Little was found among the American troops, and we do know that the diet of our men was more plentiful and varied than any other country's ration. From all records scurvy must have prevailed heavily amongst the infants of Germany, Austria, France, etc., in the recent war.

From the instances cited it at once tells you that this type of disease is distinctly of a dietary character. With this surmise, men like Eykman about 1894, Grijns, 1901, through feeding experiments on fowls produced similar conditions as were found in human beings. Later Holst and Frohlich carried out experimental work on guinea pigs which proved the diet disease. Osborne and Mendel through their work attributed eye trouble to a lack of "something" in a fat-free diet, and this today is known as xerophthalmia. This eye trouble was remedied by the mere addition of butter fat or cod-liver oil. Such fats as lard and cottonseed oil would not effect this result. We believe that today we have at least three of these contributing accessory factors in our diet which, for the lack of better names, have been called vitamins.

1. Vitamin A, or the growth promoting vitamin, found most abundantly in butter fat, egg yolk, green leaf vegetables.

2. Vitamin B, or the anti-neuritic vitamin, the lack of which induces in fowls a disease which corresponds to beri-beri in man. It can be brought about in fowls by feeding polished rice. Feed whole rice or add the polishings to the polished rice and the disease can be cured, if the animal has not been allowed to go too far.

3. Vitamin C, or the antiscorbutic vitamin. Whenever guinea pigs are fed on a diet lacking in greens, such as oats, hay, polished rice, other grains, or bread alone, a disease develops, not beri-beri but one that compares to human scurvy.

Through all times milk has been regarded as an essential part of the diet of the growing young. Way back in 1881 Lunin, and in 1906 Hopkins reported that milk will nourish young animals, whereas if fed the pure carbohydrates, fats, proteins, salts and water, such is not the case. They were alive to the fact that there was something in milk, other than its known composition, that was conducive to growth and maintenance. Later such men as Osborne, Mendel, McCollum, Davis and others showed by actual experiments that butter fat possessed a growth-producing factor which seemingly was not part of the fat in milk, but dissolved in it. Funk was the first to point out the relation between this milk factor and deficiency diseases in the growing young. Since then, many workers have shown repeatedly that the main deficiency factor is in the fat of the milk and that this fat, with few exceptions, cannot be replaced by other fats, like lard, and cottonseed oil. That "something" that is in the fat of milk and essential for growth and maintenance is vitamin A. All experiments point out that no matter how much calcium there is present, if this vitamin A is lacking you will have one or more types of decalcification, or at least non-utilization of the calcium present and eye diseases as xe-

rophthalmia, ophthalmia, etc., due to the deficiency of this particular vitamin. Correct the diet, if it has not run its course too far, and you can remedy the situation by the mere addition of the proper vitamins. It is a very simple matter to take two white rats out of the same litter, one fed on milk containing calcium and vitamins, as nature provides them, the other a synthetic diet in every way similar to milk but lacking the vitamin A. The retardation of the entire skeletal structure in the latter will be noticed.

To be convinced of the effect of the lack of one other vitamin, namely, the antiscorbutic vitamin, I developed scurvy in guinea pigs by a diet of oats and dry hay. Likewise, I examined a large number of guinea pigs dying from so-called unknown causes but which proved to be improper diet. The effect in all cases manifested itself pronouncedly in the teeth and gums. In many instances the molars and incisors became loosened, showed irregularities, and were often carious before loosening. Frequently, the teeth were soft and mealy, and once in a while they were brittle. They often became yellowish-red in appearance and lost their luster. Often the molars and occasionally incisors were so loose that they could be readily jerked out of their sockets. The gums and the tooth pulp likewise showed pronounced and varied changes, most apparent were the congested gums, often very tender and in some cases bleeding. Also this group of guinea pigs seemed to do a tremendous lot of sneezing, which might have been due to nasal disorders. On the other hand, the set of guineas carried parallel and fed in addition to oats and hay, fresh vegetables, cabbage to one group and carrots to another, were in fine health and showed no symptoms of the kind referred to and had well developed skeletal structures. In other words, that lack of "something" in vegetables, that we call vitamins, was the cause of all the trouble.

I have carried out a large number of experiments on rats fed on various types of milk. Those rats not getting the required amount of fat in milk and hence a lack of vitamin A show a much slower growth of teeth and often have a dull, and slightly chalky appearance.

Miller and Gies in 1916 and Mellanby in 1918 brought out articles showing that a diet deficient in vitamin A delayed the falling out of milk teeth, as well as the appearance of the permanent teeth. Also the lack of, or defects in the enamel and a diminished calcium content.

To many this relation of nutrition to dentition is not new, for back in 1916 Durand, in the *Journal of the American Medical Association,* pointed out the effect diet had on tooth growth. In 1921 Howe and others, in the *Journal of Dental Research,* reported similar findings.

We all know that dental carries are increasing in this country more and more, despite the fact that we are teaching the young better care of the teeth. Dr. Clark of the Washington Bureau of Health reports that ninety per cent of school children in the United States have in their teeth from one to eleven cavities. The causes trace back probably more to these factors referred to, namely the vitamins, and calcium, than any one other factor. The data on the effect of milk in children is significant.

Durand showed as follows:

	Number Examined	Number Showing Caries	Per Cent
Breast milk	418	118	28.2
Cow's milk	102	30	29.4
Sweetened condensed milk	32	17	53.1

Likewise, Seagrave has shown the results of an examination in Seattle by Department of Public Health:

	Number Examined	Number Showing Caries	Per Cent
Breast milk	829	366	42.6
Cow's milk	232	102	42.9
Sweetened milk	61	41	72.1

Durand, in his report says that "the significance of these statistics is that a poorly balanced diet, high in carbohy-

drate, and low in fat, protein, and mineral matter fed during the period in which teeth are developing, and calcifying in the jaws, seems to have rendered them doubly susceptible to decay after they erupted." During the past year my own nutritional experiments have verified this statement.

From these statistics it is evident that a proper and well-balanced diet is as essential for good tooth formation as it is for good health. I would like to emphasize the experimental fact that for young life there can be no better safeguard and prescription than good fresh milk and plenty of it for the proper development of skeletal structure. Young life demands good fresh milk and plenty of it. Fresh milk from all experiments contains something that seems to be "life" itself. Knowing this, every growing child should have at least a quart of milk per day, for proper development of skeletal structure.

All evidence supports the fact that dental decay and pyorrhea are hastened by a lack of calcium salts and vitamins, and we can also add soft foods and meats. Knowing these facts, we can easily solve good tooth developments. Supply right food, plenty milk, eggs, hard foods, green vegetables, and fresh fruits, which contain lime and vitamins. The fruits are best eaten last in that it leaves an alkaline saliva and an increase in it which means more of the enzyme. Encourage the use of dates, figs, and raisins. Have them masticate them well. Malt sugar is a better product than cane sugar; reduce the cane sugar in the diet.

Avoid bread made from highly refined flour, coarse breads are much better; avoid cane sugar and replace meats as much as possible by milk. Avoid rapid changes of extreme temperatures.

The British committee on investigations summarized its report in part as follows: "In human beings the calcification of teeth is a much slower process and continues till the eighteenth year. In order to insure perfect calcification of teeth, therefore, it is necessary that the diet should contain adequate supplies of the accessory food factors up to this time, and a deficiency in any period will be reflected in a corresponding defect in the formation of teeth."

Fisher points out that one of the factors in delayed teething is undoubtedly a lack of vitamins in food.

Experiments in my own laboratory show that the presence of the vitamin in the feeding of guineas and rats are as fundamental and essential in the formation of skeletal structures as is the calcium. One is as important as the other. To me pyorrhea represents dietetic errors, and is simply a form of scurvy.

Minerals and vitamins need as much and more attention than carbohydrates, fats and proteins, and our sources for these are cheap and plentiful. The answer to the question "Why this vitamin cry today?" is simple. Our modern methods of food preparation, refining, drying, sterilization, etc., largely destroy these vitamins and through this increase our nutritional problems. The early Indians, Romans and Greeks and Arabians who fed largely on fresh fruits, vegetables, etc., had no such worries, for they secured plenty of vitamins and minerals from the natural products.

Our concern today should begin with the mother during pregnancy. Good skeletal structure begins there. Give the youngsters a good start at birth. Supply plenty of mineral matter and accessory factors during the growing period in order to build and keep in repair their bones and teeth, and to regulate the work of their bodies, and our problem of dentition will be less complicated and the degree of suffering tremendously reduced.

WHY THE PRESENT-DAY REACTION AGAINST TOOTH EXTRACTION

By A. C. POTTER, M.D., D.D.S., St. Paul, Minnesota

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ANY discussion of this subject must embrace a consideration of the topic, focal infection in its largest aspect, as it applies to the whole human economy and not alone as it applies to the mouth. Focal infection, or more correctly speaking a focus of infection, is a circumscribed area of tissue containing micro-organisms and the products of their growth, their toxins.

The dental profession of today is face to face with one of the most important subjects any group of men has ever had to face, namely, the subject of focal infection. My entire time is given to this phase of medicine and dentistry and the more I study it, the more I am impressed with its importance. I cannot overestimate its importance nor can I unduly stress it. For in some form or other it affects the well being of our whole race. I cannot even suggest the percentage of people whose very lives are menaced by it, to say nothing at all about the role it plays in making life miserable for many and certainly shortening the lives of all who disregard it. That may seem an exaggerated statement by one who is overenthusiastic about his own subject. I will cite one or two reasons proving that it is not. Secondary anaemia of varying degrees is an almost constant finding in these focal infection cases; and it is not necessary for me to tell you that a diminished hemoglobin content of the blood with its consequent diminished oxygen carrying capacity, cannot help but have a profound effect on metabolism and the whole organism must be below par. Then again, these cases are continually absorbing poisonous toxins; and there is no more harmful toxin than that from the streptococcus group. And almost invariably these cases are streptococcic. Think what it means to have these toxins circulating in the blood day in and day out, for in many cases, years. Unfortunately these toxins are very prone to attack those highly functioning parenchyma cells of our most vital organs, for example the kidneys.

Modern dentistry of the past few decades is largely responsible for its occurrence in the mouth. But in view of our ignorance on the subject in the past, this is entirely excusable. However, in view of our present knowledge there is no excuse for its continuance.

Do you remember when you first heard or read the papers of Billings and Rosenow on oral infection—tooth infection—or if you please, abscessed teeth? Do you remember what a tremendous impression they created? The dentist was simply overwhelmed with his sudden increased importance and added responsibilities. And that branch of dentistry known as "exodontia" came forth and flourished.

The medical profession was even more impressed. Unfortunately they accepted the work as finished when in reality it was but the prelude, the introduction to a vast amount of research that was to follow. They ordered tooth extraction to

such an extent that it is now a common thing to hear of wholesale tooth extractions. They expected wonderful results. The old bogey rheumatism was to be no more, and many chronics, the bane of a physician's existence, were to be eliminated—cured, if you please.

And they were perfectly justified in their expectations. Do not for a moment think that this subject is not as important today as you thought it was then. Its possibilities are just as great and its importance has not diminished one iota.

But what have been the results? Have you read your journals lately and noticed the almost ever present article decrying and condemning useless tooth extraction? I have actually read in a reputable journal a suggestion to legislate against it. Of course that is ridiculous. I mention it just to show how far public opinion is going and how strongly it is turning against it. Or, have you attended any society meetings lately and heard this topic discussed? I have. And at a recent state society meeting I heard a most vitriolic attack condemning exodontists and this by a very prominent internist and one, who just a short while back was enthusiastic about tooth extraction. And just a few days ago I heard another equally prominent internist state that in nothing was he so keenly disappointed as in the results from tooth extraction.

Or have you heard of the many complaints from the laity? Wherever people congregate now-a-days one hears the familiar complaint or shall I say, lament, "Doctor, I had my teeth removed—even all of them, and I am no better."

This unfortunate condition which exists today—this apparent failure of tooth extraction is due to exactly three causes—exactly three and no more. The beauty of it is they are clean cut, definite, and these causes of failure can be eliminated.

One cause is definitely medical; one is definitely dental and the third is the combination of both—a lack of co-operation between the physician and dentist.

Nothing riles me more than a destructive critic—one who tears down but never constructs—one who criticizes, but never suggests. I am going to oger a constructive program for the handling of these focal infection cases. If you will follow it and be thorough you will not be disappointed. The successful treatment of even just one of these chronics to my mind makes life worth living and goes a long way towards making one happy.

I propose taking up first, the medical aspect and then the dental. And right here, let me say that these cases are inseparable medical and dental. And just as sure as you try to treat them without the closest co-operation you will fail. Get together and talk over this case or that case, you will both profit by it. The dentist should have absolute say as to what should be done in the mouth. He should not be directed to remove this or that tooth. Just as soon as that is done, the physician shares in the responsibility for the mouth. The mouth should be left entirely to the dentist and he should be held strictly accountable and responsible.

The first great cause of failure is definitely medical. It is due to superficial, incomplete or an absolute lack of medical examinations. In view of the fact that foci of infection can and do occur in all parts of the body it is absolutely essential that all of these possible foci be eliminated before the teeth are condemned, and the patient promised by word or deed a relief from symptoms.

I haven't any personal quarrel with the medical profession as I am one of them, but I do say that a large percentage of physicians are doing very superficial work. It is an every-day practice to send patients for tooth extraction without any real effort being made to arrive at any diagnosis at all. And then when the patient having lost his or her teeth is not improved, the physician begins to look for something else. And the patient becomes an ever present witness to testify against tooth extraction. The ordinary so-called physical examination will not do at all. Some of the most painstaking

endeavor in a physical examination is entirely unnecessary and time wasted and on the other hand some areas that are usually overlooked are very important as being the frequent site of infection.

It is a fact that we all play our favorites, we do certain parts of our work better than others. For instance, certain of you do especially good malleted gold fillings while others are well known for their excellent gold inlays; at the same time you yourself know that there are certain parts of your work that you dislike and are anything but proud of. This same condition holds true of the medical profession. Certain physicians who do excellent diagnostic work on the head are loath to massage a prostate while others who are recognized as good abdominal diagnostitians are likely to overlook other parts such as tonsils and sinuses.

I propose giving the steps of this examination somewhat in detail, not that I think that a dentist should attempt to do any part of it. But I do think a dentist should know all that he possibly can about this important phase of his work so that he can intelligently discuss it with his patients.

A history is essential and I lay great stress upon the very first question of a history—the age of the patient. It is a fact that a large percentage of these cases come to our attention when past the age of forty. This is due to the fact that our natural inherent resistance begins to diminish in many people at about that time. Of course this varies markedly and I frequently see cases of sixty years or over taking care of large areas of infection with apparently no ill effects. On the other hand, we frequently see young individuals with marked secondary involvement. In these young individuals this is usually due to protracted illness or to some prostrating illness such as influenza. I know of no disease that so completely and consistently knocks out our resistance as influenza. Take for example the pneumonias following our recent pandemic of influenza; also the large number of sinus infections.

History of sore throat. (Tonsilitis.)

History of susceptibility to "colds" in the head. (Rhinitis) and excoriations around the alae of the nose suggesting the possibility of a chronic antrum infection.

History of gastro-intestinal symptoms.

History suggesting heart lesion.

History of venereal disease.

The present complaint is then considered. Almost invariably the patient complains of lassitude, as they usually put it, a lack of pep and we hear the frequently repeated statement—"Doctor, I am just as tired when I get up in the morning as when I go to bed at night. I am always tired and I lack the ambition to attend to business that I formerly had." Neuritis and arthritis in their various manifestations are common complaints. They are painful and naturally the patient is more concerned with them than with some of the graver conditions which are not painful, but much more serious. And now the examination of the patient paying special attention to the parts suggested by the history. But examination of the following must never be omitted, I should say that ninety per cent of foci are found in the following locations:

The sinuses: It is really surprising the number of chronic sinus cases one meets. I am depending more and more upon transillumination rather than the X-ray.

The tonsils: I do not think that the man lives who can tell an infected tonsil by looking at it. It must be manipulated and pressed hard. One is often rewarded by pus from an innocent looking tonsil. The tonsil that is most frequently condemned—the hyperthrophic tonsil—is really the least offensive. The small submerged tonsil with gapping crypts is the real offender.

The heart: The most frequent manifestation as a secondary lesion from the alveolus is not a valvular endocarditis, but a myocarditis. A long drawn out insidious process in which the normal

heart muscle is more or less replaced by connective tissue with its consequent very serious effects upon the whole body.

Gall bladder: Infection should always be suspected when chronic gastro-intestinal symptoms are present.

The prostate gland: It is a more frequent offender than possibly any of you think. The prostate should always be massaged, certainly if there is a history of venereal disease. The prostatic fluid should be examined for pus and cultured. Positive cultures are almost invariably staphylococcic.

In the laboratory there must be made a hemanalysis and urinalysis. Hemanalysis reveals an almost constant secondary anaemia and a leucopenia. If the urinalysis reveals findings indicative of a kidney lesion, our elimination of any foci should be most complete. Areas that are even suspicious or questionable should be eliminated with the object in view of relieving the damaged kidneys of all unnecessary strain.

The lower extremities: I shall call attention to the feet and furthermore, I desire to stress the importance of including them in any examination because it is a regular thing for patients to be referred for tooth extraction on account of pains in the back, knees and ankles, usually diagnosed as "rheumatism." All too frequently this condition is due to a falling of the transverse arch of the foot with its consequent irritation of the terminal filaments of the sciatic nerve, also a damming back of the blood giving a lack of tone and a relaxed condition of the whole foot and then the falling of the antero-posterior arch. The falling of either arch and especially the transverse—the one often overlooked—will give the train of familiar symptoms.

How foolish it is to promise a patient relief by tooth extraction alone, overlooking all of these other frequent possibilities and yet this is precisely what is being done every day. Is it any wonder that the outcome of such a large percentage of these cases is unsatisfactory and that tooth extraction is condemned by many, and considered a failure?

Now on the other hand, a dentist is just as much to be condemned who is not thorough in his work. When a case is referred to a dentist it is not sufficient for him to report on pyorrhea, caries, malocclusion, etc. His examination must include radiograms of all suspicious areas and by all means all edentulous areas. These radiograms must be good radiograms intelligently interpreted. I say intelligently advisedly and furthermore I desire to stress it because the second great cause of the failure of tooth extraction is due to poor radiograms, impossible of correct interpretation and to unrecognized areas of alveolar osteomyelitis occurring in edentulous areas.

These osteomyelitic areas are diffuse, non-limited and the possibility of absorption and secondary systemic involvement is infinitely greater than from any other lesion found in the mouth. These areas are exceedingly vascular, the capillaries traversing the infectious material like a net-work, differing markedly from the familiar granuloma where the capillaries are peripheral traversing the connective tissue wall only. Radiographically these osteomyelitic areas appear as diffuse areas of increased radiolucence, in which the characteristic irregular appearance of a normally regenerated socket is absent, the shadow being usually quite dark and of even density. A description of the operative procedure for the removal of these foci is not within the province of this paper.

Just an additional word about resistance or immunity. Keep resistance in mind constantly; remember that a body with good resistance will take care of an overwhelming amount of infection. While with a lessened resistance an insignificant area may be the cause of all of the patient's symptoms and remember that between every alveolar focus and secondary infection we have resistance. It plays a wonderful role; without it our best efforts would be of little avail.

ORTHODONTIA.—A CONSIDERATION OF CAUSATIVE FACTORS FROM THE POINT OF VIEW OF PREVENTION

By B. G. DE VRIES, D.D.S., Minneapolis, Minnesota

(Read before the Minnesota State Dental Association, Minneapolis, Minnesota, February, 1922)

IT HAS been clearly demonstrated that the best cure for any known ailment lies in its prevention. To any observer of however limited mental capacity, the thought engendered by constant contact with the sequelae of disease in its many forms, must necessarily be, "What has produced this condition?" This persistent thought in the minds of more than mediocre investigators has already given to the medical and dental professions a fund of etiologic data to which all have access and from which we must continually draw and add to in the advancement of our respective sciences. And whereas the so-called "healing art" in its primary endeavors concerned itself chiefly with the treatment and eradication of existent forms, it now has learned that an authoritative public education through the mouthpiece of organized dental and medical science lie the greatest potentialities for the perfection of the human race. Were it not for this development, our professions would truly be but sorry purveyors to the ills of humanity. The foregoing may safely be considered as the basic premise of this short paper, in which I shall endeavor to refresh the memories of all of us upon a few outstanding points which may aid us in the discharge of our professional obligation to our patients.

Orthodontia unfortunately seems to occupy but a small portion of the greater field of general dentistry. It has often appeared to me that in general sessions of our society, such as this, but small relative importance is accorded to it by the rank and file of our membership. This may not be due, in any greater measure, to the wilful ignoring of the subject by the general practitioner than to a wilful lack of co-operation on the part of the specialist in orthodontia. Certainly it behooves the specialist to at least attempt to give to his more broadly equipped confrere, whatever of value he may have discovered in his restricted special field, and by the same token, the general practitioner should be surely willing to meet such an attitude in a receptive frame of mind. Only together can we hope to accomplish results to which individually we could not attain.

It is not my purpose to deal with the mechanics of tooth movement. I feel that general interest does not accrue to such technic. However, some one has ably said that the general dental practitioner and the pediatrist are the greatest potential orthodontists, and we all fall into this category. Let us endeavor to ascertain just why we are all potential orthodontists.

Malocclusion is largely a symptom and not a cause. The thought immediately arises as to what it is symptomatic of. And at once you find yourself in the field of etiology. Further, by whom is the orthodontic specialist chiefly consulted? The answer comes almost universally

identical. By the parents of children in whom facial and oral defects are so pronounced that they, the parents, have open, microscopic evidence of it. No disease or malformation, excepting that resultant from trauma, reaches its peak instantaneously. It requires a developmental period and in maldevelopments this may be expressed in weeks, months, or years. However at some point we have the underlying cause manifesting itself through the incipient symptom. At this point, therefore, we should all be in a measure capable of ascertaining the probable result of neglect and be alert to give adequate warning to those in charge of such a child. Is this, then, too great a service to expect from our profession in general, or must such a responsibility devolve wholly upon the specialist in orthodontia? To both of these questions the answer can only be in the negative. And whereas the general practitioner does and should find himself consulted by trusting adults concerning the oral and dental health of their little ones, his opportunity for this service becomes a large one.

It is fine to generalize in the foregoing manner, but generalization depends upon the application of certain definite and concrete courses of procedure if it is to produce a tangible result. We shall deal then with a few definite, clinical manifestations which commonly present to all of you as general practitioners and which presage oral malformation if neglected.

At this point I wish to emphasize the importance and necessity of a thorough knowledge of the normal in the area with which we have to deal. This is imperative for otherwise what we observe has no true significance. The works of Noyes, Dewey, Bogue and others are recommended in this connection, particularly with reference to the development of the deciduous dental arch as to the treatment of deciduous arches, Bogue says, "It is my belief that most if not all, lack of developments can be diagnosed from the deciduous arches and that great benefit can be derived from early treatment." Swinehart, in his presidential address in 1921, to the Eastern Association of Graduates of the Angle School of Orthodontia, says, "Restoration and maintenance of normal functions of all tissues over which the orthodontist can exert influence is the true aim of treatment, and certainly those concerned with growth and development are not the least important. With our present knowledge of the laws which govern these functions, it would seem wise to err in being too early rather than too late. Long sustained effort has been made to eradicate the exceedingly harmful opinion that it is better to wait until all of the permanent teeth are erupted before beginning treatment. Unfortunately such advice is still met with. Statements that it is often better to postpone treatment are liable to be misconstrued unless fully qualified."

From this statement it is inferred that some opposition to the treatment of the deciduous arches still exists, although this opinion seems to be that of the minority. The logic of this viewpoint seems weak when it is remembered that maldevelopment, if allowed to continue, surely does so through a period of life when nature should be offering the best assistance to the proper kind of treatment. Why is it not logical then to enlist the aid of nature rather than to let a maldevelopment find its fullest fruition before instituting proper corrective procedures? I will admit that the problems dealing with the dental arches are undoubtedly influenced by the fact that a complete, new set of permanent teeth will supplant the deciduous teeth, but it must also be conceded that nature intended the deciduous teeth to serve a definite purpose in the life of the developing child and that surely that purpose can be best consummated when all conditions are as nearly normal as possible. Are we then justified in allowing abnormal conditions to prevail in the development of the deciduous arches on the assumption that we can readily correct or eliminate all possible sequelae

from such neglect after the permanent teeth have erupted? Present data does not warrant us in taking such a chance.

In his discussion of a recent paper dealing with this subject, Dr. Delabarre of Boston speaks as follows: "There is one point I would emphasize in particular as being the one way in which the general practitioner of dentistry can help the orthodontist most. That one way is through an adequate appreciation of the fact that it is absolutely essential to preserve the temporary teeth in health throughout their intended life. And why? For the most obvious reason that in all cases of malocclusion that we come across, neglect of the temporary teeth seems frequent and most severe, complicating the things with which we have to deal. If we could have our cases of malocclusion come to us without the complications that creep in through neglect of the temporary teeth, through their decay, through their being abscessed, and to early loss, our cases of malocclusion would be much simpler to handle."

We shall enlarge on Dr. Delabarre's statement to add that in this manner the dental practitioner can also render the child an inestimable service toward the attainment of normally developed dental arches, and make a distinct contribution in the field of the prevention of malocclusion.

In a recent examination of twelve hundred children between the ages of seven and fourteen, in various parts of the state of Minnesota, I found three hundred and twenty-three cases of Class 1 (Angles Classification) cases of pronounced malocclusion. As you undoubtedly know, this class embraces cases having so-called normal relation of the six year molars mesio-distally and is characterized by a crowded condition of the arches complicated by degrees of impaction and rotation of the individual teeth. A majority of such types of malocclusion is brought about by mechanical causes, such as premature loss of the deciduous teeth through neglect, and concomitant decay and infection with consequent loss of developmental influences in the determination of arch form. In a large degree such a condition is preventable if sufficient emphasis is placed upon the importance of maintaining the entity of the deciduous arches through their full term. It would seem that when the incidence of such types of malformations reveals in our own community conservatively as much as twenty-six plus per cent, it is high time that we as a profession arouse ourselves to a proper recognition of these facts both in our individual private practices and in our educational activities. All of the impassioned pleas of silver-tongued orators and written articles in the world can avail nothing if the majority of the dental profession continues to ignore its rightful obligation to the children in its practices.

The relationship of diet to oral health and development is becoming more and more apparent each day as investigators probe into this problem. We must keep pace with every new thought which has a bearing upon the welfare of the areas in which we operate. It is not sufficient to say that this field lies wholly and entirely within the province of the pediatrist, for the results of malnutrition surely evidence themselves in the dental development of the child. Could mothers realize that improper care in this direction during infancy might jeopardize the dental and oral development in their offspring, it would give them additional concern. And who has better opportunities of education along this line than the members of the dental profession? A former rachitic child may at the age of two and a half years be completely re-established in its assimilation and metabolism, but its maldeveloped dental arches still bear mute testimony at the ages of five and six years to its former condition and warn us of approaching trouble, while at later ages, hypoplastic six year molars and anteriors become an ineradicable stigma. These facts should concern us gravely if we really are striving for a proper edu-

cation of the laity toward the prevention of oral ills and maldevelopment. Too often are we confronted with patients of twelve and fourteen years presenting marked maldevelopment and consequent facial deformity requiring months of persistent treatment for their partial correction. And too often must we evade the parent's question as to whether it would not have been better to have stimulated development during the more responsive earlier years before muscular maldevelopment had complicated our problems. The old adage, "The mill will never run again with the water that has passed," has, indeed, a pertinent application.

The relationship of hypertrophied lymphoid tissue, infected tonsils and various nasal stenosis to malformed dental arches has already been too thoroughly dwelt upon to require further amplification here. Our literature abounds with data on this point and even the most superficial student cannot have failed to be cognizant of this factor. Also, the evil effects of mechanical habits such as thumb and finger sucking, etc., are probably patent to you all. I take the position that mere knowledge of these matters is not sufficient in itself, for knowledge only becomes valuable through its dissemination. Our knowledge must be practically applied to present every day routine, and what the brain has conceived the eye should surely see. It is not enough for us to see the cavity in a child's tooth; it is not enough to beautifully fill that cavity; it is not enough nor is it truly professional to behold only the factors of minor mechanical importance and eliminate from our eyes the whole picture of a divinely-created developing child.

I am not urging the dental profession to rush into the field of general medicine, nor to dictate rules of living to the public. Our attitude must be, however, one of a broad conception of the potentialities of our relationship to our patients. When a mouth-breathing, snuffling, anemic, little girl comes to you for a filling in a deciduous tooth, for just one moment consider her as your own daughter. The carious tooth will recede in importance as the whole picture flashes upon you, and a resultant timely suggestion may mean the difference between happiness and sorrow in the life of a patient.

Let us all then see to our mental equipment although our actual field of operation may be limited. Let us welcome with a personal application, all phases of our profession and endeavor through serious and discreet conduct, to not only elevate ourselves to a bigger and broader plane, but to make our profession an enviable and invaluable one in its relation to the attainment of bodily health.

Reminiscences of Forty-five Years in Dentistry

By C. N. JOHNSON, M.A., L.D.S., D.D.S., M.D.S., F.A.C.D., Chicago, Illinois

XI

I HAVE never knowingly deceived a patient except on three occasions in my life. Once it was unintentional, once on the impulse of the moment, and once the most deliberate and premeditated thing I ever did. The first instance was that of a lady for whom I had constructed a partial upper denture, carrying among other teeth a cuspid. For some reason, which I was unable to determine, she did not like that cuspid. After listening to her objection, I said that I thought if the tooth were placed at a different angle it would be satisfactory. "No, Doctor," said she, "it isn't that—it is the *shape* of the tooth." "All right," I said, "I will send to the dental depot and get several teeth, and let you select your own." That idea seemed to please her greatly, and she remarked, "If you do that I shall be *perfectly* satisfied—I know the kind of a tooth I want."

The following day when she appeared at the office I removed the tooth from the denture, and as it came away it rolled near the other teeth which I had obtained from the depot. Without the slightest premeditation, or the least intent to deceive her, I allowed the tooth to remain among the others, with the sole idea that the larger the number of teeth the better selection she would feel she had. Never hesitating for one moment she unerringly picked up this very tooth, and placing it in position in her mouth, remarked, "There, Doctor, that is the kind of tooth I have wanted all the time." Without comment I replaced the tooth on the denture, and she was perfectly satisfied. If any one thinks there is not some psychology in practicing dentistry, let him ponder on this case.

The second instance was one in which quickness of decision was necessary. I had as a patient a prominent Judge who was one of the most dignified and proper gentlemen I have ever known. He also wore a partial denture supported by gold clasps. One morning as I was operating, the Judge rushed into my office, and without waiting to be announced, came straight to the operating-room door, and frantically beckoned to me. I was at a loss to know whether the earth had twisted out of its orbit, or what terrible thing had happened. I had never seen the Judge when he was not the essence of calmness and perfect poise, but this morning as I stepped away from the chair he exclaimed excitedly "Doctor, I am in a *devil* of a fix!" When I got my breath, I asked what the trouble was. "I have broken part of one of the clasps on this plate," said he, "and of course I cannot keep it up. I have to go into court this morning in a very important case, and I am at a loss to know what to do." "Never mind, Judge," I said quietly, "we will fix that." I saw at a glance that he *could* keep the denture up because he was doing it that moment.

"Let me see it," I remarked, and when the denture was in my hand, I took a pair of pliers and bent the remaining part of the clasp slightly—just enough to show him that I was working at it. Needless to say the trifling alteration I made in the clasp had not the least effect on the denture, but he slipped it in his mouth with the utmost assurance, and went away perfectly comfortable. The question is—was I justified in employing that subterfuge? Ordinarily I believe in looking a patient in the face, and telling him the cold facts; but in this case I am inclined to fall back on the old adage, which has never much appealed to me: "Where ignorance is bliss, it is folly to be wise."

In the third instance of deception, I practiced, as I have intimated, as deliberate a bit of work as I ever did in my life, and I am going to claim justification. A lady came to me from another dentist much dissatisfied with his services, and with the remark that she would never go back to him. He had been treating an upper molar and bicuspid, and had accidentally allowed some arsenic to gain access to the interproximal space. In my heart I could not censure him for not telling her what had happened because she was a very exacting and difficult patient to manage, and it was an accident that might occur with any one. The tissues were of course quite sore, and I made several applications for their amelioration—all the while waiting for the sequestrum of process to loosen, so I could remove it. At every treatment the patient sought to quiz me regarding what had happened to occasion so much disturbance, hinting repeatedly that such a man as that should be prosecuted. I determined that there should be no prosecution in this case if I could prevent it. All I knew about the dentist was that he was a young man, and therefore entitled to my consideration and protection.

When the sequestrum became sufficiently detached, I arranged an appointment, and cutting a piece of rubber-dam so large that it covered the entire side of her face, I applied it to the teeth. With this broad expanse of dam it was possible to prevent the patient from seeing anything that was going on. When the dam was in place I cut the strip between the molar and bicuspid, giving me perfect access to the interproximal space. I was thereby enabled to remove the bone without her knowledge, and to this day she is none the wiser as to what happened.

In all conscience there are enough difficulties for the average young man to surmount, and enough pitfalls for the most conscientious to encounter, without adding to them the very terrible experience of having a suit brought for damages, and I am going to take it for granted that the rank and file of the young men who go out to practice are actuated by an honest desire to serve their patients well, and I shall protect them in every way within my power. This does not mean that I in the least condone wilful neglect nor persistent carelessness or indifference. Every young man should take the seriousness of his professional obligations closely to heart, and never leave a stone unturned to see that his patients are served acceptably and well; but with the best of endeavors and in the most skilful hands, accidents may happen, and mistakes may be made. It is always easier to pick a flaw in the other man's procedures than it is to invariably accomplish perfect results one's self, and this should be borne in mind when passing judgment on others. I therefore make no apology for deceiving this particular patient. My sole duty to her consisted in giving her the best service of which I was capable, and this I did.

On principle, I am opposed to deception with patients in the ordinary run of our relationship with them. Perfect frankness is the only safe policy, and this is particularly true in dealing with children. I would no more think of practicing deceit upon a child than I would of

telling a lie to a saint. And I take some satisfaction in the fact that in a rather extensive association with people of all types, in a long period of practice, these are the only three cases in which I have ever intentionally deceived any one.

In 1914 when I was in Paris, a banquet was tendered me about a week before the war broke out, and at that banquet I met for the first time Professor Gires, who had translated one of my books into French. He told at the dinner the following story, which so amused me that I venture to repeat it. In this book I had dwelt at some length on the subject of salivary calculus, and evidently Professor Gries had drilled this into his students. One day he had two of the boys before him for a verbal examination. One was a very bright boy, and the other the opposite. He asked the bright student to outline a certain cavity preparation according to Dr. Johnson. The boy did so, and Professor Gires complimented him. Turning to the other student he asked: "What is salivary calculus?" The boy hesitated a moment and then said: "Salivary calculus—is something—*that was invented by Dr. Johnson.*" In my long and active career I have been charged with a great many things, but never with anything quite so bad as this charge of the French boy. Considering the immense damage done by this material to the human family it was no great compliment to be announced as its inventor—but that is one of the penalties of writing a book—only one.

Among the many amusing experiences of my professional life there is one which stands out in my mind as unique. Years ago I was traveling with my family up on the Georgian Bay, and we called at Parry Sound for a visit with my old friend and former student Dr. Emerson Cunningham. He met us at the boat, and on the way to his office I saw there was something disturbing him and asked what it was. "Oh," said he, "I am in trouble as usual, and you will have to help me out. I was fitting a gold crown on a lower molar for a young chap just now, and it dropped in his mouth. I said, 'Don't swallow it,' and immediately he swallowed it." I told Dr. Cunningham that if he had kept quiet and not mentioned swallowing it the patient probably would not have done so. "Too late to think of that now," said he, "but anyhow, I am going to get that crown." I asked him how? "I've just given the boy a good emetic."

The idea amused me so that I could hardly wait till I reached the office to see the patient. Here I found a husky young chap, waiting for us as serenely as possible, without the slightest indication of nausea. I asked Dr. Cunningham what emetic he had given him, and he told me ipecac. I could not understand it, and finally asked the boy if he had ever been nauseated in his life? "No sir, never," was his reply. "It's no use," I said. "We will have to make another crown—I will help you." The patient must have been in the office a couple of hours from the time he took the ipecac till we finished the new crown, and was not disturbed in the least, but all through the process of making the crown Dr. Cunningham was quite grouchy over losing his other one. A few months ago—not being able to recall the dose of ipecac Dr. Cuningham had given the boy—I wrote him asking the amount. His answer was as follows: "I not only gave him tincture of ipecac, but hot water and mustard first, then a teaspoonful of tincture of ipecac, and twenty minutes after I gave him two teaspoonfuls more, and you know the result. Did I ever tell you the aftermath? His sister was working in a store in another town, and she faked a telegram as coming from me, and demanding that the crown be returned or he would have to pay for it. She kept the poor chap worried about ten days before she told him it was a fake."

But the swallowing of a crown does not always turn out so amusingly as that.

(*To be continued*)

TAGGART PATENTS HELD INVALID

UNITED STATES COURT OF APPEALS AFFIRMED DECISION OF THE DISTRICT COURT IN TAGGART VERSUS ALLIANCE

No. 2943. October Term, 1921, April Session, 1922.

WILLIAM H. TAGGART, *Appellant*,

vs.

M. D. K. BREMNER, T. B. S. WALLACE, *Et al., Appellees.*

Appeal from the District Court of the United States for the Northern District of Illinois, Eastern Division.

Before Baker, Alschuler and Evans, Circuit Judges.

Baker, Circuit Judge, delivered the opinion of the Court:

Appellant failed in his suit to enjoin the alleged infringement of four patents relating to dental inlays.

No. 983,580 covers an apparatus for making castings, and was held by the District Court to be valid but not infringed. We agree that non-infringement clearly appears, and for that reason it is not necessary in this litigation to inquire into validity and scope.

No. 872,978 is for a method of making molds, and the following claim is typical:

"The method of forming patterns for casting dental inlays which consists of molding plastic material in the cavity to be filled to the size and shape of the desired inlay and obtaining the lower contour of the pattern by co-operation of the plastic material with the cavity wall."

No. 865,823 is for an apparatus for making the molds, and the following claim is typical:

"In a device of the class described, the combination with a flask of a cover therefor having a projection adapted to form a depression in the mold to serve as a crucible for melting the metal, and a sprue-former having a reduced end adapted to be attached at one end to the pattern and to have its reduced end inserted in a perforation in the center of the projection of said cover."

No. 983,579 is for a method of making dental inlays, and the following claim is typical:

"The method of making a dental inlay filling which consists of melting the metal in a crucible-shaped depression in a mold which is provided with a hollow of the size and shape of the desired filling and with a sprue-hole connecting the hollow with the depression, and forcing the molten metal by gas-pressure into the hollow."

This same patent also claims the inlay as a product:

"A dental inlay cast entire from molten metal and being throughout of metal of the same composition and being cast to the size and shape necessary to fill the cavity for which it is intended."

At the trial the evidence was all produced in open court and the judge had an opportunity to determine weight and credibility that is denied to us. But the printed pages satisfy us beyond a doubt that Philbrook, preceding appellant by ten years, put and maintained in public use the following method of making dental inlays (with apparatus adequate to the method): He prepared the tooth cavity; he caused the walls of the tooth

cavity to determine the size and shape of the pattern composed of plastic material, namely, dental wax; he formed a mold about the wax pattern; he formed a crucible-shaped depression in the mold; he formed a sprue-hole connecting the crucible and the interior of the mold from which he melted out the wax pattern; he melted the inlay metal in the crucible; and by air pressure he forced the molten metal into the hollow.

This finding would seem to destroy all the claims of all the patents except the non-infringed machine patent. But counsel assert that Philbrook used only Watts metal for his inlays, and urge that Taggart's "invention" (spoken of as an integer) gave gold inlays to the dental profession and that his invention should be protected by limiting the claims to gold. Several objections obtrude. There is evidence that Philbrook's method, as practiced by himself and others, included the use of gold. (To reverse the decree we would have to find against this evidence.) Taggart's claims cover all metals suitable for dental inlays, and there is nothing in the specifications and claims to indicate any greater difficulties in using gold than in using other suitable metals. But especially, we have been unable to find a single claim in which all of the essential elements of the Taggart process as applicable to metals in general have been integrated. Each of the forty-six claims that were put in issue must in law be considered as a separate invention. Counsel has failed to point to any claim which is for such a detailed and specific improvement over the prior art that it could be saved by limiting metal to gold. It is beyond our province to take this, that and the other element from broad claims and construct a narrow claim which might be saved by making it still narrower through interpretation. We may only construe the documents as they stand.

The decree is AFFIRMED.

A True Copy.

Teste: .....

Clerk of the United States Circuit Court of Appeals for the Seventh Circuit.

COPY

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Editorial Department

THE PRINCIPLE OF RECIPROCITY

In a country as great in extent and as varied in interests as the United States, it is a somewhat complex matter to harmonize methods, rules and regulations for the guidance of the citizens of the various communities. This was recognized by the founders of this great Commonwealth when they incorporated in the Federal Constitution a provision empowering the different states of the Union to enact laws and regulations concerning their own internal affairs, and associated with their police powers. Thus it is that the various states enact legislation to govern the practice of dentistry within their border, and this is their fundamental right as provided in the constitution.

But in the practical application of this principle there has developed a situation which has worked a serious hardship on many very excellent men. It has frequently happened in the natural order of things that practitioners of dentistry have wanted to move from one section of the United States to another. There are very many of the exigencies of life which make it necessary, desirable, and even praiseworthy for men to do this. The variations in climatic conditions in different sections of the country, the constantly changing economic situations in our complex modern life, the urge and pull of family relationships—these and many other influences too patent to be mentioned all work in an insistent manner to force men to change their location. It has occurred in numerous instances in the past, and will occur in numerous instances in the future. It could not be otherwise.

But what is the situation? When a man decides that it would be conducive to his welfare, or that of his family, to move from one state, to another, he at once encounters the bars of the different state laws, and over these bars he is frequently unable to climb. Supposing a practitioner in Florida or Alabama, who has served the people of his community honorably and well for twenty or thirty years, suddenly finds that due to some vested interests in Wisconsin or Minnesota it is imperative that he change his residence to one of these states. Or supposing a man, in one of our northern states is informed by his physician that in order to save the life of his wife, or his child, or even his own life, he must move to a climate farther south. Without reciprocity between the various states, these men find confronting them the specific regulations of the state they wish to enter. And some of these regulations are of such a character that it is quite impossible for the practitioner of years standing to meet them. What a farce it is to demand of a mature practitioner—one whose clinical experience has enabled him to meet all of the emergencies which enter into the daily routine of the practice of dentistry, and whose years of observation and application have developed a judgment which cannot in the very nature of things ever be found in the recent graduate—what a farce to exact from a man like that an examination in the minute anatomy of the neck or thorax, or to confront him with an intricate problem in chemistry. Some of the greatest men we have had in the profession, after engaging in practice for a number of years, never could have passed an average State Board examination. And even if they could, think of the injustice of demanding it of them!

Take a concrete example: Across the line bordering two states there may be a town in which practices a man who is known the world over as a splendid dentist. He is renowned as a superior operator, as a cultured gentleman, as an ornament to any community. He has been honored by his profession and by the people of his state, and he is entitled

to all the honors that have come to him. Let this man take a few steps across the road without so much as the necessity of wearing on his feet anything more than his bedroom slippers, and let him proceed along precisely the same lines by virtue of which he has justly gained all the honors in his own state, and immediately he is subject to prosecution as a criminal.

Supposing the late Dr. G. V. Black, the dental Colossus of his time, had desired to go from Illinois and engage in practice in some other state, and supposing reciprocal relations had not been consummated between this other state and Illinois. Think of G. V. Black being subjected to an examination by a member of a State Board, who had been appointed by the Governor, as has sometimes been done, because he was a good ward heeler and could swing a certain number of votes on election day. The very gods from Olympus would have looked down and wept.

Supposing a man is an eminent teacher, and is thereby called from one section of the country to another to teach his specialty, and he finds the environment more to his liking, and a wider field for genuine service than in his own state, and he concludes to locate in his new environment. Before he can offer his services to the people he must submit to an examination by men who could more appropriately sit at his feet and learn.

These are not mere fanciful conceptions, or figments of the imagination; but concrete and altogether possible facts under our present conditions. What then is the remedy? There is one, and it is high time that our authorities in every state in the Union took cognizance of it, and proceeded to act accordingly.

While we cannot, as has just been intimated, have a Federal law to regulate the practice of dentistry throughout the country, it will be found on close examination of all the state laws, that the legislature has usually granted to the state boards the privilege of formulating reasonable rules for the admission of candidates to practice within the state. A state board may therefore with justice and propriety enter into reciprocal relations with other state boards to accept candidates for registration on the properly safeguarded endorsement of the board in the state from which the candidate comes. That this is possible of practical application is amply borne out by the fact that this arrangement has been in successful operation by many of our state boards for some time. Two main contentions have been urged against it—neither of which is tenable. The one is that it presents a loop-hole for unworthy and unprincipled men to flit from one state to another and work their nefarious plans upon the people; and the other is that certain states are so situated, climatically and otherwise, that they would naturally become the dumping ground for all the other states.

The first of these contentions is met by the provision made by most

boards having reciprocal agreements, that they will recommend for licensure only men who have been in honorable and ethical practice in their state a reasonable time. It is not the purpose of reciprocity to furnish a refuge for these "fly-by-nights," and in the states that have been operating under reciprocal relations, there has been no complaint of this kind of abuse.

As to the dumping ground argument, let us see. Usually these states are clamorous in their invitations to citizens of other communities to come and locate in their midst. The merchant, the real estate man, the manufacturer, the laborer—all are received with open arms—and even the undertaker is not frowned upon. Why then should the cold shoulder be turned to professional men? They are usually pretty reputable citizens, and it is not on record that they have ever worked a very serious hardship on any community. And even if there should be a slight hardship, when it comes to a question of equity and justice—when it is a matter of fundamental right, man to man—can any community afford to stand out on a policy of exclusiveness, and erect a professional wall around it? We think not, and we are sure that when the principle of reciprocity is carefully considered in all its bearings, every state in the Union will be glad to become a participant, and thus demonstrate a unified profession from one end of the land to the other. This is only equity—it is only justice; and that which is equitable and just must eventually prevail.

RESOLUTION ON RECIPROCITY

The House of Delegates at the Los Angeles meeting passed the following resolution:

WHEREAS, It has long been the consensus of opinion of a large majority of the dental profession that existing conditions regarding licensure in the different states of the Union have not advanced in line with the development of dentistry; and

WHEREAS, In the absence of reciprocity between the states many worthy practitioners are subjected to serious inconvenience and even to embarrassment when desirous of moving from one state to another; and

WHEREAS, It seems to be a profound and unanswerable fact that a man who is qualified to care for the teeth of the people of one state is qualified to care for the teeth of the people of another state; and

WHEREAS, Many of the states have already established reciprocal relations one with the other; therefore, be it

Resolved, That it is the sense of this meeting that the moral force of the American Dental Association should be exerted on all those states which may not have reciprocity to induce them to take such steps as may be necessary to bring about a universal reciprocity from one end of the Union to the other; and

Resolved, That a committee of three be appointed to take this matter in charge and to continue their efforts until a successful termination is reached.

VOTED THAT THE RESOLUTIONS BE ADOPTED AND THE COMMITTEE ASKED FOR BE APPOINTED.

Announcements

CALENDAR OF MEETINGS

NATIONAL SOCIETIES

American Dental Association, September 10-14, 1923, Cleveland, Ohio.

American Society of Orthodontists, April 9, 10, 11, 1923, Edgewater Beach Hotel, Chicago, Illinois.

STATE SOCIETIES

December

Ohio State Dental Society, at Cincinnati (5, 6, 7).
Oregon, at Portland (7, 8, 9).

February (1923)

Minnesota, at St. Paul (6-8).

March

Michigan, at Detroit (27, 28, 29, 30, 31).
Vermont, at Burlington (14, 15, 16).

April

Alabama, at Birmingham (2nd Tuesday).
Connecticut, at Hartford (19, 20, 21).
Kentucky, at Louisville (16, 17, 18, 19).
Kansas, at Wichita.
Mississippi, at Laurel.
Missouri, at St. Louis.
New Jersey, at Trenton (11, 12, 13).

May

Illinois, at Decatur (8, 9, 10).
Indiana, at Indianapolis (14, 15, 16, 17).
Iowa, at Des Moines (1, 2, 3).
Louisiana, at New Orleans.
Massachusetts, at Boston (2, 3, 4).
Nebraska, at Omaha (21, 22, 23, 24).
New York, at New York City (9, 10, 11, 12).
North Carolina and Virginia, at Pinehurst, N. C. (7).
Pennsylvania, Philadelphia (8, 9, 10).
South Dakota, at Huron.
Tennessee, at Nashville (2, 3, 4, 5).
West Virginia, at Wheeling (21, 22, 23).

June

California, at San Francisco (11-15).
Idaho, at Boise.
New Hampshire, at The Weirs (21, 22).
Southern California, at Los Angeles.
Utah, at Salt Lake City.
Wyoming, at Loraine.

July

Montana, at Missoula.
Wisconsin, at Milwaukee (10, 11, 12).

MEETINGS OF STATE BOARD OF DENTAL EXAMINERS

Arkansas, December 15. Secretary, H. J. Crume, Wilson Bldg., El Dorado.

California, at San Francisco, December 9. Secretary, C. A. Herrick, 133 Geary St., San Francisco.

Colorado, at State House, Denver, first Tuesdays of December and June, continuing five days. Secretary, Wm. H. Flint, Littleton.

Connecticut, at Hartford, November 23, 24 and 25. Arthur B. Holmes, Secretary, 63 Bank Street, Waterbury.

Illinois, Rooms 1006 and 1007, City Hall and County Building, November 13 and 14; University of Illinois Dental College, November 15 and 16, Chicago.

Kansas, at Chamber of Commerce Bldg., Kansas City, December 4. Secretary, G. F. Ambrose, El Dorado.

Michigan, at Dental College, Ann Arbor, November 13 to 18 inclusive. Secretary, E. O. Gillespie, 745 David Whitney Building, Detroit.

New Jersey, at Trenton, December 4 to 8, inclusive. Secretary, John C. Forsyth, 429 E State St., Trenton.

North Carolina, at Wilson, January 11. Secretary, F. L. Hunt, Asheville.

Pennsylvania, at University of Pittsburg, Pittsburg, and Temple University, 18th and Buttonwood Sts., Philadelphia, December 6, 7, 8 and 9. Secretary, Alexander H. Reynolds, 4630 Chester Ave., Philadelphia.

Oklahoma, at State Capitol Building, Oklahoma City, December 18.

Rhode Island, at State House, Providence, December 5, 6 and 7. Secretary, Albert L.

Midgley, 315 Butler Exchange Bldg., Providence.

Texas, at Dental College, Houston, December 11 to 14 inclusive. Secretary, R. L. Rogers, Amarillo.

Wisconsin, at Milwaukee, December 18 to 22. Secretary, J. L. Blish, Fond du Lac.

CONNECTICUT STATE DENTAL ASSOCIATION

The fifty-ninth annual meeting of the Connecticut State Dental Association will be held at Hartford, Connecticut, April 19, 20 and 21, 1923.

S. E. ARMSTRONG, *Secretary,*
792 Chapel St., New Haven, Conn.

THE DENTAL SOCIETY OF THE STATE OF NEW YORK

The fifty-fifth annual meeting of The Dental Society of the State of New York will be held at the Hotel Commodore, New York City, May 9, 10, 11 and 12, 1923. A cordial invitation is extended to all ethical practitioners, residents of New York and sister states. Admission to all literary meetings and clinics will be secured by presentation of cards disclosing membership in State and American Dental Association Societies. All literary exercises, clinics, and exhibits will be staged in the Hotel Commodore.

The Executive Council for the transaction of business will convene Tuesday, May 8, at 3:00 P. M.

The exhibits will be in charge of Clinic Committee, H. C. Bennett chairman, 376 Fifth Avenue, New York City. Exhibitors please address Dr. Bennett for further information. Exhibitors desiring space should secure same without delay.

Every effort is being put forth to make the 55th meeting in all respects the most attractive and memorable in the history of the society.

Hotel reservations should be made direct with the hotel management. For further information and programs address

A. P. BURKHART, *Secretary,*
89 Genesee St., Auburn, N. Y.

THE NEW JERSEY STATE DENTAL SOCIETY

The fifty-third annual meeting of the New Jersey State Dental Society will be held in the Stacy-Trent Hotel, Trenton, New Jersey, April 11, 12 and 13, 1923. For information address

R. S. HOPKINS, *Convention Director,*
913 Broad St., Newark, N. J.
F. K. HEAZELTON, *Secretary,*
223 East Hanover St., Trenton, N. J.

MINNESOTA STATE DENTAL ASSOCIATION

The fortieth annual meeting of the Minnesota State Dental Association will be held at the St. Paul Auditorium, St. Paul, Minnesota, February 6, 7 and 8, 1923.

C. H. TURNQUIST, *Secretary,*
388 LaSalle Bldg., Minneapolis, Minn.

TEXAS BOARD OF EXAMINERS

The Texas State Board of Dental Examiners will hold their next examination in Houston, Texas, at the Texas Dental College, beginning on December 11 and continuing through the 14th, 1922.

For information address

R. L. ROGERS, *Secretary,*
Amarillo, Texas.

WISCONSIN BOARD OF DENTAL EXAMINERS

The Wisconsin State Board of Dental Examiners will hold examinations for license on December 18 to 22, 1922, in Milwaukee. Both dentists and dental hygienists will be examined. Applications must be filed at least ten days before examinations. For information and blanks write to

J. L. BLISH, D.D.S., *Secretary,*
Fond du Lac, Wis.

ARKANSAS STATE BOARD OF DENTAL EXAMINERS

The Arkansas State Board of Dental Examiners will call a special mid-year meeting December 15, for the purpose of examining applicants.

Applications must be in the hands of the Secretary not later than December 1, 1922. For further information and application blanks address,

H. J. CRUME, *Secretary,*
Wilson Bldg., El Dorado, Ark.

OKLAHOMA STATE BOARD MEETING

The next meeting of the Oklahoma State Board of Dental Examiners will be held in the State Capitol Building at Oklahoma City, Oklahoma, December 18, 1922.

KANSAS STATE BOARD MEETING

The Kansas State Board of Dental Examiners will meet in the Chamber of Commerce Building, Kansas City, Kansas, December 4, 1922, beginning at 9:00 A. M. For further information write

G. F. AMBROSE, *Secretary,*
El Dorado, Kansas.

NORTH CAROLINA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the North Carolina State Board of Dental Examiners will be held at Wilson, North Carolina, beginning promptly at 9 o'clock on Thursday morning, January 11, 1923. For further information and application blank, address

F. L. HUNT, *Secretary,*
Asheville, N. C.

ILLINOIS BOARD OF DENTAL EXAMINERS

The state of Illinois dental examination will be held at Chicago, Illinois, November 13 to 16, 1922. The written work will be held in rooms 1006 and 1007 City Hall and County Building, November 13 and 14, at 8:30 A. M. The practical work will be held in the University of Illinois Dental College, November 15 and 16, at 8:30 A. M.

CALIFORNIA BOARD OF DENTAL EXAMINERS

The next examination by the Board of Dental Examiners of California of applicants for a license to practice dentistry in that state will be held at San Francisco beginning on December 9, 1922, at 9:30 A. M. For further particulars, address

C. A. HERRICK, *Secretary,*
133 Geary St., San Francisco, Cal.

COLORADO STATE BOARD OF DENTAL EXAMINERS

The Colorado State Board of Dental Examiners will hold its examinations in the State House, Denver, Colorado, the first Tuesdays of June and December, continuing five days. For application blanks and further information apply to

WM. H. FLINT, D.D.S., *Secretary,*
Littleton, Colorado.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS

The next regular examination of the Pennsylvania Board of Dental Examiners will be held at the University of Pittsburgh, Pittsburgh, and the Temple University, 18th and Buttonwood Streets, Philadelphia, on Wednesday, Thursday, Friday and Saturday, December 6, 7, 8, and 9.

The theoretical examinations will begin on Wednesday, December 6, at 9:00 A. M. The examinations in practical work will be held on Saturday, December 9, starting with the operative work at 8:30 A. M. Application papers may be secured from the Department of Public Instruction, Harrisburg.

The examinations for hygienists will be held at the same time and places. For further information address

ALEXANDER H. REYNOLDS, *Secretary,*
4630 Chester Ave., Philadelphia.

RHODE ISLAND BOARD OF REGISTRATION

The annual meeting of the Rhode Island Board of Registration in dentistry for the examination of applicants will be held in the State House, Providence, Rhode Island, December 5, 6, and 7, 1922. All applications with proper fee must be filed one week previous. For further information address,

ALBERT L. MIDGLEY, *Secretary,*
315 Butler Exchange Bldg., Providence, R. I.

MASSACHUSETTS DENTAL HYGIENISTS' ASSOCIATION

The Massachusetts Dental Hygienists' Association held their third meeting at the Hotel Victoria, Boston, Massachusetts, September 26.

Miss Evelyn Schmidt, mouth hygiene instructor of the Massachusetts Department of Public Health, spoke to the members on "Dental Health Work in Massachusetts."

AMERICAN INSTITUTE OF DENTAL TEACHERS

The thirteenth annual meeting of the American Institute of Dental Teachers will be held at Creighton University, Omaha, Nebraska, Hotel Fontenelle headquarters, January 22, 23, 24 and 25, 1923.

A cordial invitation is extended to all persons interested in dental teaching.

A. H. HIPPLE, *President,*
ABRAM HOFFMAN, *Secretary,*
381 Linwood Ave., Buffalo, N. Y.

DENTAL PROTECTIVE ASSOCIATION OF THE UNITED STATES

The annual meeting of the Dental Protective Association of the United States will be held at the Palmer House, State and Monroe Sts., Chicago, Illinois, on Monday, December 18, at 4:00 P. M. sharp. The report of the officers will be given; a board of directors will be elected and such other business transactions as should come before the association.

All members are urgently requested to be present. By order of Board of Directors,

J. G. REID, *President,*
D. M. GALLIE, *Vice-President & Treas.,*
E. W. ELLIOT, *Secretary.*

PROGRAM OF THE OHIO STATE DENTAL SOCIETY

FIFTY-SEVENTH ANNUAL SESSION, DECEMBER 5, 6, 7, 1922

DEDICATION OF CALLAHAN MEMORIAL

GIBSON HOTEL
Cincinnati, Ohio

TUESDAY MORNING, DECEMBER 5

MANUFACTURERS' AND DEALERS' CLINICS

Registration (*Mezzanine Floor*) ..... 8:30 A.M.
First General Session (*Gibson Hotel, Ball-room*) ..... 10:00 A. M.
Meeting Board of Directors (*Ball-room floor, right of elevator*) ..... 11:00 A. M.

TUESDAY NOON (Twelve O'clock Sharp)

BALANCED DIET LUNCHEON

Sidney J. Rauh, Chairman

Four minute talks on:

Diet and Mouth Hygiene.

The Relation of Dentistry to General Social Problems and Public Health.

The Committee promises a novel program and some surprises.

TUESDAY AFTERNOON 2:00 P. M.

Partial Dentures.
By Charles A. Furrow ..... Tulsa, Okla.

Preventive Dentistry.
By Arthur H. Merritt ..... New York City

Election of Officers.

TUESDAY EVENING 8:00 P. M.

Mottled Enamel (Original Researches).
By J. Leon Williams ..... Solon, Maine

Discussed by
Arthur D. Black ..... Chicago, Ill.
Weston A. Price ..... Cleveland, Ohio

The Principle of Diffusion Applied to the Callahan Method of Pulp-Canal Filling.

The Positive Destruction of Apical Infection by Electrolytic Medication.
By Harry B. Johnston ..... Atlanta, Ga.

Questionnaire.

WEDNESDAY AFTERNOON 1:30 P. M.

UNVEILING OF MEMORIAL TO JOHN R. CALLAHAN

Memorial Address
By R. Ottolengui ..... New York City

Presentation of Award to J. Leon Williams, Solon, Maine.
By Weston A. Price ..... Cleveland, Ohio

WEDNESDAY EVENING 6:00 P. M. SHARP

INFORMAL DINNER

IN HONOR OF J. LEON WILLIAMS

Gibson Hotel Ball-room

WEDNESDAY EVENING 8:00 P. M.

Program of the Session furnished by The American Academy of Periodontology.

The Bacteriology of Focal Infection.
By John G. Meisser.....Rochester, Minn.

Blood Chemistry as a Diagnostic Aid in Focal Infection.
By R. N. DeNiord.....Buffalo, N. Y.

Discussed by
Martin H. Fisher.....Cincinnati, Ohio
John Oppie McCall.....Buffalo, N. Y.

WEDNESDAY AND THURSDAY MORNINGS 9:00 A. M.

LECTURE CLINICS

Partial Dentures.
By Charles Furrow.....Tulsa, Okla.

Gold Inlay Technic (Indirect Method).
By Toledo Clinic Club.....Toledo, Ohio

Root-Canal Technic.
By Detroit Clinic Group.....Detroit, Mich.

Cast Gold Inlays.
By Roscoe H. Volland.....Iowa City, Iowa

Elimination of Pus Pockets.
By Arthur D. Black.....Chicago, Ill.
Frederick W. Merrifield.....Chicago, Ill.

Operative Procedure for Removal of Cysts.
By H. W. MacMillan.....Cincinnati, Ohio

Orthodontia.
By Wilson H. Foster.....Cincinnati, Ohio

Surgical Removal of Mylo-hyoid Ridge.
By W. B. Caldwell.....Hamilton, Ohio

Roentgen Ray as Guide in Pyorrhea.
By R. R. Roush.....Columbus, Ohio

Removable Bridge, Wrought Clasps.
By M. E. Neiswonger.....Dayton, Ohio

Fixed Bridge.

Porcelain Jacket Crown.
By E. W. Graebner.....Cleveland, Ohio

Full Denture Construction.
By Cincinnati Clinic Club.....Cincinnati, Ohio

REDUCED RAILROAD RATES TO THE OHIO MEETING

Reduced Rates Granted to All Members of the American Dental Association Residing in the Central Passenger Association's Territory. It is Expected that Several of the Other Passenger Associations Will Also Grant This Special Rate

IMPORTANT RAILROAD INFORMATION

Suggested advice to members of the organization respecting reduction authorized on the certificate plan for benefit of members and dependent members of their families.

A reduction of one and one-half fare on the "Certificate Plan" will apply for members attending the meeting of American Dental Association, Ohio State Component, to be held at Gibson Hotel, Cincinnati, Ohio, December 5-7, 1922, and also for dependent members of their families, and the arrangement will apply from the following territory:

Central Passenger Association territory: In all probability your committee will be able to have this same privilege granted on other lines as this meeting will be National in scope.

The following directions are submitted for your guidance:

1. Tickets at the regular one-way tariff fare for the going journey may be obtained on any of the following dates (but not on any other date): December 1-7. Be sure that, when purchasing your going ticket, you request a CERTIFICATE. *Do not make the mistake of asking for a "receipt".*

2. Present yourself at the railroad station for ticket and certificate at least thirty minutes before departure of train on which you will begin your journey.

3. *Certificates are not kept at all stations.* If you inquire at your home station, you can ascertain whether certificates and through tickets can be obtained to place of meeting. If not obtainable at your home station, the agent will inform you at what station they can be obtained. You can in such case purchase a local ticket to the station which has certificates in stock, where you can purchase a through ticket and at the same time ask for and obtain a *certificate* to the place of meeting.

4. Immediately on your arrival at the meeting present your certificate to the endorsing officer, Dr. H. E. Germann, chairman, as the reduced fare for the return journey will not apply unless you are properly identified as provided for by the certificate.

5. Arrangements have been made for validation of certificates by a Special Agent of the carriers on December 5-7, if the required minimum of 250 certificates is presented.

6. *No refund of fare will be made on account of failure to either obtain a proper certificate nor on account of failure to have the certificate validated.*

7. So as to prevent disappointment, it must be understood that the reduction on the return journey is not guaranteed, but is contingent on an attendance of not less than 250 members of the organization at the meeting and dependent members of their families, holding regularly issued certificates obtained from ticket agents at starting points, showing payment of regular one-way tariff fare of not less than 67 cents on going journey.

8. If the necessary minimum of 250 certificates is presented to the Special

Agent as above explained, and your certificate is duly validated, you will be entitled up to and including December 11, to a return ticket via the same route over which you made the going journey, at one-half of the regular one-way tariff fare from the place of the meeting to the point at which your certificate was issued.

9. Return ticket issued at the reduced fare will not be good on any limited train on which such reduced fare transportation is not honored.

REPORT OF THE JOHN R. CALLAHAN MEMORIAL

By T. I. WAY, Chairman, and H. E. GERMANN, Secretary-Treasurer

The fund secured has made it possible to establish The Memorial in the two phases planned,—the Local Memorial and the Callahan Memorial Award Commisison.

The Local Memorial, consisting of a one and two-thirds life sized bronze bust of John R. Callahan, mounted on granite base, the work of Sculptor Frederick C. Hibbard, of Chicago, has been completed and placed in the general hospital grounds in Cincinnati, will be dedicated at the meeting of the Ohio State Dental Society in Cincinnati, December 5, 6, 7, 1922, at which time J. Leon Williams will receive the first award conferred by the Callahan Memorial Award Commission composed of seven members of the American Dental Association.

The John R. Callahan Exhibit, consisting of mounted specimens, slides, records, etc., which reposed in the National Research Institute in Cleveland, was transferred to the Callahan Memorial Commission by the trustees of the institute to become a part of the memorial, has been mounted in a special room in the General Hospital buildings where it will be open to visitors and be preserved in good form.

The cost of the Local Memorial together with the expenses of the committee incurred in its installating, etc., will approximate $4,000.00 will leave a substantial fund which will be turned over to the Callahan Memorial Award Commission to carry on the work for which it was created.

The subscriptions to the fund total $9,027.51, which have been received as follows:

Alabama State Dental Society	$ 100.00
Committee—Charles F. Chandler Frank F. Perry H. Clay Hassell	
California, Dr. J. P. Buckley, Los Angeles	25.00
California Southern Dental Assoc.	150.00
Committee—W. E. Sibley Bert Boyd Lewis E. Ford	
*Colorado State Dental Society	205.00
Committee—W. T. Chambers H. W. Le Fevre H. F. Hoffman	
Delaware, W. C. Speakman	10.00
*District of Columbia Dental Society..	
Committee—A. B. Crane W. M. Simkins	
Allen, C. B.	$1.00
Baker, D. T.	2.00
Basseches, Chas.	1.00
Biggs, I. E.	1.00
Book, L. O.	1.00
Bol, Edw. J.	2.00
Binkert, A.	1.00
Cobey, H. P.	5.00
Crane, A. B.	5.00
Cuthbertson, Chas. W.	1.00
Cole, Seth E.	1.00
Cary, Fred	2.00
Culillier, L. M.	3.00
Cole, J. B.	1.00
Cummings, A. W.	3.00
Conly, M. J.	1.00
Dietz, B. I.	1.00
DeFarges, J. R.	5.00
Evans, P. W.	5.00
Fansles, O. N.	2.00
Horen, E. B.	2.00
Houghtelin, W. C.	1.00
Hogan, John R.	2.00
Hopkins, H. C.	3.00
Lohr, V. J.	2.00
Longcor, C. C.	1.00
Laytor, R. E.	2.00
Macdonald, G. B. R.	2.00
McCausland	5.00
Miller, L. P.	3.00
Netherland, Frank B.	1.00
Palkin, J. R.	1.00
Price, W.	3.00
Pairo, W. E.	1.00
Riley, H. B.	1.00
Richardson, R. G.	1.00
Rush, A. E.	1.00

*Individual Subscriptions.

Spillan, H. M.	3.00	
Shelton, Chas. R.	1.00	
Shade, E. C.	5.00	
Schalhirt, Wm.	5.00	
Stone, E. R.	3.00	
Solback, L. W.	1.00	
Simkins, W. M.	2.00	
Smith, Edw. S.	3.00	
Taylor, J. A.	2.00	
Thorn, D. S.	2.00	
Taylor, B. L.	5.00	
Williams, C. C.	1.00	
Weakley	5.00	
Wolfe, Allen F.	5.00	
Wyman, W. W.	1.00	
Cash	1.00	
Geo. Washington Dental School	5.00	
		$ 126.00

Florida State Dental Society 45.00
Committee—W. G. Mason
C. J. Caraballo
J. E. Chace

Georgia (Mid-Winter Clinic of the Atlanta Dental Society) 200.00
Committee—Thomas P. Hinman
DeLos L. Hill
K. R. Armstrong

Illinois State Dental Society 100.00

*Illinois 235.00
Committee—Don M. Gallie
L. B. Torrence
J. P. Luthringer

Indiana State Dental Society 100.00
Committee—D. A. House
F. J. Prow
C. E. Redmon

Kansas State Dental Society 200.00
Committee—Monte Gants
C. K. Weaver
F. O. Hetrick

Kentucky State Dental Society 100.00
Committee—H. K. Kellogg
W. W. Randall
Henry B. Tileston

*Louisiana State Dental Society.....
Committee—C. S. Tuller
C. Edmund Kells
Leo C. Dempsey

Broussard, A. C.	$10.00
Bennett, T. S.	5.00
Braud, O. L.	5.00
Capo, John T.	5.00
Crozat, Geo. B.	10.00
Dempsey, Leo C.	5.00
Ducasse, A. L.	10.00
Ducasse, E. B.	10.00
Ehlert, Wm.	2.00
Foret, A. J.	10.00
Fort, A. K.	10.00
Guillory, A. W.	5.00
Gaston, Robt. W.	10.00
Gorman, J. A.	10.00
Grosjean, S. S.	5.00
Healey, W. J.	2.00
Howard, Mary Jane	10.00
Kells, C. Edmund	10.00
Knapp, J. Rollo	2.00
Kelleher, Chas. P.	5.00
Leoffel, O. L.	5.00
La Cour, B. J.	2.00
Moore, H. M.	10.00
Olivier, J. R.	2.50
Ory, O. J.	10.00
Sarrazin, J. J.	10.00
Tenny, J. W.	5.00
Tuller, C. S.	10.00
Vignes, C. V.	5.00
Wahl, J. P.	5.00
Gross Total	$205.50
Expenses for Postage, Stationery, Stenographer, Etc.	24.00
Net Total	181.50

*Individual Subscriptions.

Massachusetts State Dental Society..... 100.00
Committee—Geo. C. Ainsworth
J. Arthur Furbish

Michigan State Dental Society 100.00
Committee—Chas. H. Oakman
C. J. Lyons
C. S. Larned

Missouri State Dental Society 100.00
Committee—H. F. D'Oench
H. C. Pollock
John H. Kennerly

New York State .....
Committee—R. Ottolengui
Edward G. Link
A. C. Bickelhaupt

DR. R. OTTOLENGUI:

N. Y. State Dental Society	$500.00
First District Society.....	200.00
First District Society (Pathodontia Section)	100.00
Second District Society	100.00
*1st & 2d District Societies..	169.00
*Delta Sigma Delta	$165.00
Mr. G. Strassburger of the Borine Mfg. Co.	10.00
Dr. Arthur B. Crane, Washington D. C.	
Dr. Thomas J. Rice, Washington, D. C.	200.00
Dr. F. W. Proseus	2.00
Dr. Wm. Taggart, Chicago, Illinois	100.00
	$1,371.00

DR. EDWARD G. LINK:
Sixth District
3 Members 3.00

*Individual Subscriptions.

Seventh District

51 Members	96.50
Seventh District Society	100.00
Primrose & Johnson Co.	5.00
Mr. A. F. Pieper	5.00

Eighth District

8 Members	24.00
Eighth District Dental Soc.	50.00
Buffalo Dental Assoc.	30.00
Rochester Dental Society	25.00
University of Buffalo Alumni Association	25.00

Miscellaneous

Dr. A. E. Preston, Delevan	1.00
Drs. Anderson & Drake, Jamestown	2.00
Dr. L. I. Childs, Springville	1.00
Dr. Cavers	5.00
Individual subscriptions	18.00
Gross Total	$390.50
Expenses Printing, Postage, Etc.	50.45
Net Total	$340.05

Dr. A. C. Bickelhaupt:

Cook, A. R., Syracuse, N. Y.	$ 1.00
Webb, E. R., Syracuse, N. Y.	2.00
Carroll, J. F., Syracuse, N. Y.	1.00
Beach, G. B., Syracuse, N. Y.	5.00
Coe, I. J., Syracuse, N. Y.	.50
Roblin, A. C., Syracuse, N. Y.	2.00
Turner, H. H., Syracuse, N. Y.	2.00
Craner, Chas., Syracuse, N. Y.	2.00
Bickelhaupt, A. C., Syracuse	5.00
Slocum, Oswego, N. Y.	2.00
Cullen, T. R., Oswego, N. Y.	2.00
McCormick, Oswego, N. Y.	2.00
J. Garlinghouse, Clinton, N. Y.	1.00
Monroe, Saranac Lake, N. Y.	5.00
Neff, Carthage, N. Y.	5.00
Rose Coxon, Utica, N. Y.	5.00
E. I. Harrington, Watertown, N. Y.	1.00
L. A. Timmerman, Amsterdam, N. Y.	1.00
Fifth District Dental Society	50.00
Elmira Dental Society	25.00
	$119.50
Expenses—Syracuse Letter Co. $6.99	
Postage 7.00	13.99
Net Total	$105.51

		$1,816.56
Ohio State Dental Society	$1,000.00	
Ohio State Den. Soc. (Preparedness League)	623.80	
Cincinnati Dental Society	300.00	
*Cincinnati Dental Society	$578.00	
S. A. Crocker Co.	25.00	
G. W. Fels Co.	25.00	
Harmeyer & Brand Company	25.00	
Cincinnati Dental Supply Co.	3.00	
Miss Isabel Ellison	25.00	
Mr. I. Ettlinger	10.00	
Mr. Edm'd Kerper	10.00	
		701.00
*Cleveland Dental Society	$366.00	
Hirach, S. F.	5.00	
Harris, J. W.	5.00	
Saum, I. M.	5.00	
Shaffer, J. D.	1.00	
Smith, W. P.	5.00	
Roe, T. B.	1.00	
Whitslar, W. H.	5.00	
Price, Weston A.	50.00	
Casto, F. M.	50.00	
		493.00
Cleveland Dental Mfg. Co.	50.00	
Toledo Dental Soc.	$100.00	
*Toledo Dental Soc.	100.00	
		200.00
Loraine Co. Den. Soc.	25.00	
*Mad River Den. Soc.	24.00	
Corydon-Palmer Den. Soc.	$50.00	
Dr. W. H. Hayden	10.00	
		60.00
Northern Ohio Den. Soc.	100.00	
Eastern Ohio Den. Soc.	25.00	
Southern Ohio Den. Soc.	25.00	
Rehwinkle Den. Soc.	100.00	
*North Central Ohio Dental Society	20.00	
*Western Ohio Den. Soc.	36.00	
*Miami Valley Den. Soc.	184.00	
*Stark County Den. Soc.	42.00	
*Columbus Dental Society	230.79	
Total		$4,239.59
Oklahoma State Dental Society		100.00
Committee—C. R. Lawrence, J. A. Morrow, W. E. Flesher		
Pennsylvania		
Committee—Fred D. Miller, Geo. S. Schlegel		
Chester & Delaware Co., Pa.	$30.00	
Phil'd'hia Odontographic Soc.	25.00	
Central Pennsylvania Society	25.00	
Reading Dental Society	43.00	
Dr. Bender	1.00	
		124.00
Rhode Island State Dental Society		25.00
Committee—James F. Clark, H. P. Beckett, Frank P. Gleeson		

*Individual Subscriptions.

South Carolina State Dental Society....		71.50
Committee—G. A. Milner		
E. C. Dye		
W. C. Milhouse		
Tennessee, State Dental Society		100.00
Committee—Stanley L. Rich		
G. L. Powers		
R. B. Bogle		
Virginia State Dental Soc.....$200.00		
Committee—S. B. Ward		
G. F. Keesee		
J. A. C. Hoggan		
Richmond Den. Soc., Va.....	25.00	
		225.00
West Virginia State Dental Society.....		200.00
Committee—O. W. Burdats		
C. H. Neill		
Homer Mannon		
*Wyoming State Dental Society		
Committee—Peter Appel		
William Kocher		
J. L. Jefferis		
Larrick, V. E. .....$	1.00	
Devine, J. A.	1.00	
Davis, F. S.	1.00	
Hunt, L. E.	1.00	
Jefferis, J. L.	1.00	
Chamberlin, Mark	1.00	
Docal, O. B.	1.00	
Hay, L. E.	1.00	
Long, J. H.	1.00	
West, H. C.	1.00	
Andrew, W. H.	1.00	
Appel, Peter	1.00	
		12.00
Holland, Rotterdam Dental Society....		36.36
Grand Total .....$		9,027.51

Cincinnati, Ohio.
September 21st, 1922.

*Individual Subscriptions.

CREIGHTON DENTAL ALUMNI ASSOCIATION

The annual alumni meeting and home-coming of Creighton University dental alumni will be held at Creighton Dental College, Omaha, Nebraska, January 22 to 25, 1923.

The program includes special clinics and papers and an address by Dr. Chas. Mayo, of Rochester, Minnesota.

All ethical members of the profession are invited.

GEORGE M. BOEHLER, *President*,
Omaha, Nebr.
W. E. STOFT, *Secretary*,
Omaha, Nebr.

ALPHA OMEGA FRATERNITY CONVENTION

The fifteenth annual convention of the Alpha Omega (Dental) Fraternity will be held in Philadelphia, Pennsylvania, on December 27, 28, 29, 1922. For detailed information address

B. M. BRICKMAN, *Supreme Scribe*,
6334 Woodland Ave., W. Philadelphia, Pa.

AMERICAN SOCIETY OF ORTHODONTISTS

The twenty-second annual meeting of the American Society of Orthodontists will be held in Chicago, at the Edgewater Beach Hotel, April 9, 10 and 11, 1923. A cordial invitation is extended to all those interested in orthodontia to meet with us.

BURT ABELL, *President*.
WALTER H. ELLIS, *Secretary-Treasurer*.

DENTAL CORPS ORDERS FROM WAR DEPARTMENT

ARMY

Captain Glenn D. Lacey is relieved from duty at Walter Reed General Hospital, D. C., and will report to attending surgeon, Washington, from duty.

Captain Benjamin H. Dean, now on leave at Middlesboro, Ky., will proceed to Fort Oglethorpe, Ga., station hospital for observation and treatment.—*Army and Navy Register*, September 23, 1923.

Lieutenant Colonel Minot E. Scott to Fitzsimons General Hospital, Denver, Colo., for duty.

Major William A. Squires from duties at Camp Dix, N. J., and detailed as assistant professor of military science and tactics, University of Pennsylvania, Philadelphia.

Captain Rowland E. Stafford from duty at Camp Travis, Tex., and detailed as assistant professor of military science and tactics, Georgia School of Technology, Atlanta.

Captain Dell S. Gray from Fort McPherson, Ga., to Walter Reed General Hospital, D. C., for observation and treatment.—*Army and Navy Register*, September 30, 1923.

DENTAL TREATMENT FOR NURSES

Question recently arose as to payment for dental treatment of an army nurse by civilian dentists while technically on active duty, but at home, while on authorized leave, and after separation from service. The comptroller general says:

"Dental treatment as such of army personnel by civilian dentists has not been specifically authorized by statute, but as included in medical treatment is provided for by the

annual appropriation acts for the medical department of the army, the act of July 9, 1918, being here applicable, which is as follows:

" 'For medical care and treatment not otherwise provided for, including care and subsistence in private hospitals of officers, enlisted men, and civilian employes of the army, of applicants for enlistment, and of prisoners of war and other persons in military custody or confinement, when entitled thereto by law, regulations, or contact: Provided further, that this shall not apply to officers and enlisted men who are treated in private hospitals or by civilian physicians while on furlough.'

"It may clearly be held that army nurses, although not specifically mentioned, are included in the classes of army personnel to whom the appropriation for medical treatment, other than through army facilities, relates; but, as the proviso excluding persons on furlough is limited to officers and enlisted men, after mention of other classes in the appropriation, it must be held that army nurses are not affected by the proviso. Accordingly, eliminating the proviso from further consideration, the right of army nurses to private medical treatment is based on the wording of the appropriation itself, which is limited to treatment of persons 'when entitled thereto by law, regulation, or contract.'

"On May 2, 1919, the nurse in this case, while at home, was not on actual duty in the ordinary sense and may be considered to have been 'on duty without troops' under orders of the war department within the meaning of the regulations and entitled to medical treatment. The dental treatment rendered her, being evidently of an emergency nature, may be classed as an allowable expense, having been recommended for payment by the surgeon general of the army.

"From May 3 to June 2, 1919, the nurse was on leave of absence and had the status of 'absent from duty' within the meaning of the regulations, and reimbursement by the government of expense of dental treatment rendered her during that period is expressly prohibited.

"From June 3 to June 20, 1919, the nurse was not in the service, and there is no law or regulation providing for reimbursement of expense of dental treatment rendered after separation from the service, although same may have been contracted for while still in the service."—*Army and Navy Register,* September 16, 1922.

Division of Naval Dentistry

A division of dentistry has been established as an individual section in the bureau of medicine and surgery, Navy Department, according to an announcement of Surgeon General E. R. Stitt, U. S. N. This division is in charge of an officer of the dental corps and its function will be the administration and control of all dental affairs under the supervision of the surgeon general.

In a letter sent to the senior members of the naval dental corps concerning the formation of the dental division, the surgeon general expressed himself as realizing that this division was warranted by the marked advances made in dentistry in recent years and its relative importance as a factor in maintaining the health of the naval personnel.

The officer in charge of the new division, Lieutenant Commander Geo. H. Reed, D. C., U. S. N., assumes the same relation to the chief of the bureau as the heads of other divisions, and being a dental officer is better equipped to understand the problems that come within the scope of the profession.

Active preparations are in progress for the new naval dental school, which is to open shortly as a part of the naval medical school in this city. It is expected that these preparations will be completed in about a month. —*Army and Navy Register,* September 16, 1922.

Navy Dental School

Quarters at the Navy Medical School, in Washington, D. C., are being prepared for the accommodation of the Navy Dental School, which will shortly be organized with a regular course of instruction somewhat similar to the Navy Medical School for officers of that corps. The student body at the dental school will comprise the newly appointed members of the corps, who will be instructed in the Navy requirements of their profession. The school will also be open to officers of the corps who have had some naval service, but who desire to avail themselves of the advantages which the school will afford. A further announcement regarding the scope of instruction at the school, as well as an outline of the course and the officers in charge of the classes, will appear in subsequent issues of this paper.—*Army and Navy Register,* October 7, 1922.